M I N N O V A   I N C .

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FROM: A. Hill

SUBJECT: Observations regarding the SAMATOSUM deposit.

After three months of total immersion in the new and historical drill core at SAM, I thought that this would be a good time to summarize some of my observations regarding the alteration, along with some ideas regarding ore genesis. No doubt these ideas will evolve with further investigations!

1. The overlying mafic volcanic package of rocks are in fault contact with a (structurally) underlying sedimentary sequence. This contact is variably expressed as a 3-10+m wide zone of shearing, brecciation, mylonitization, and gouge and is believed to represent a major fault, probably a thrust.

2. The sedimentary sequence consists of a thick and apparently upright pile of turbiditic sediments, with lithologies ranging from black argillite and siltstone, to fine sandy greywacke, coarse lithic wacke, and (uncommonly) conglomerate. These rocks occur together in classic cyclical bedded Bouma sequences, where the argillite and siltstone is laminated to thinly bedded, and the wacke and lithic wacke are medium to thickly bedded, respectively. Texturally, the rocks exhibit soft sediment deformation features, graded beds, truncated beds, rip-up clasts, and other features one would expect in a typical turbidite basin where sedimentation rates are high. This sequence has undergone variable deformation and locally intense hydrothermal alteration.

3. The overlying mafic volcanics are typically dark green, chloritic lapilli tuff with minor pillowed flows and ash tuff. They are commonly somewhat calcareous, owing to the presence of thin quartz-calcite stringers. In the vicinity of its lower contact the mafic pile becomes noticeably altered, with the lapilli often first affected several tens of meters above the basal fault. The alteration consists of the creation of a yellow-brown sericite (replacing chlorite), and a pervasive ferrodolomitization, along with fine disseminated pyrite. The above mentioned quartz-calcite stringers are typically deformed and converted to ferrodolomite-quartz and a noticeable strengthening of fabric and alteration continues downwards toward the fault.

On the other side of the fault, the sediments display a weaker, crosscutting, Fe dol-qtz stringer controlled alteration. Variable amounts of brown-sericite and pervasive ferrodolomitization are present, depending largely on the susceptibility of the host rock.

4. Fault-related ferrodolomitization elswhere on the property is widespread and clearly a late feature. The alteration can be pervasive or vein controlled and has many appearances, based on its intensity, and the host rock's texture. Careful systematic staining is, therefore, sometimes necessary for recognition in fresh drill core. This alteration is capable of permeating 25m or more away from faults, if a porous or chemically susceptible host is encountered. The vein-controlled form of the alteration can extend even farther if open fractures or dilatant zones occur as a result of the faulting. These resulting ferrodolomite-quartz veins are distinctively coarse grained, sometimes vuggy, and often clearly crosscutting. Furthermore, veins of this type have been observed carrying significant base metal mineralization. They range from high within the overlying mafics, to thoughout the sediments (some of the 266 and "creek" zone intersections may be of this type), and deep in the lower mafics (RG 254 at 3000 feet).

5. The turbiditic sediments at SAM are locally hydrothermally altered in three distinctive and overlapping ways:

(i) Intense silicification associated with coalescing and ghosted quartz stockworks and pervasive grey "cherty" silicification. Numerous traverses into and out of this alteration, and along strike in drill core, reveal that intense silica flooding of all sediment types can gradationally create a rock of this appearance.

(ii) Yellow sericitie-quartz veinlets-pyrite alteration. The quartz veins are typically highly deformed and boudined, with yellow sericite and pyrite comprising the remainder of the rock. On the fringes of this type of altered zone, highly contorted laminated sediments cut by swarming quartz veinlets have been observed, with incomplete sericitization and pyrite development along contorted laminations.

It is hypothesized that this yellow sericite alteration may be an incomplete variety of the type described in (i), as they commonly occur in close proximity. Both (i) and (ii) occur peripheral to (iii).

(iii) Grey sericite-pyrite-quartz alteration consisting of prevasive development of phyllitic grey to shiny silver sericite along with usually at least 10% finely disseminated pyrite and not uncommonly 30%+ pyrite. Quartz content is highly variable and ranges from about 20% to 80% in the form of pervasive grey silica and ghosted white veins and stockworks. Many of the quartz veinlets contain significant amounts of pyrite,sphalerite, galena, and chalcopyrite within them and in semi-massive seams along their margins. In areas of intense stockworking these seams may coalesce to form "massive" (low Ag) sulfides in a bull quartz matrix, (eg. RG-85).

These distinctive and obviously very important alteration zones seem to have an affinity for portions of the sedimentary pile that are coarser grained (wacke, lithic wacke) or for ground that is otherwise prepared, such as tectonic and hydraulic breccias.

6. High silver ore is present at the point of intersection of a "massive" base-metal . sulfide seam and quartz-ferrodolomite veining within an obvious crossfault on sections 96+80mW to 97+20mW, (and probably on other less well studied sections). It is hypothesized that base metals were reconcentrated or upgraded, and tetrahedrite was created, by reactions involving the fault-related ferrodolomite rich fluids. In fact, in the pit evidence shows numerous crosscutting Fe dol-qtz. veinlets intimate with tetrahedrite rich ore.

The intersection of the WNW trending fault plane (dip about 35 SSW) and the sulfide seam (striking NW with a 45 NE dip) creates a lineament which plunges roughly 10 degrees towards the ESE. This appears to be the main structural ore control at the SAM deposit. (see stereograph below).

CONCLUSION

In conclusion, I . think that the complete understanding of the genesis of the SAM deposit is uncertain........... but it is evolving!

It is hoped that the database will continue evolving also, through aggresive research in the form of further isotopic dating, a fluid inclusion study, petrography, pit mapping, core logging and more core logging!

Respectfully submitted,

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