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SAMATOSIN DEPOSIT - STRUCTURAL MAPPING PROJECT

To: Ian Pirie

From: Keith Glover

Copy: Alex Davidson
Bob Friesen
Kerry Curtis

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This progress report is intended to provide a summary of my preliminary findings and ideas on the Sam deposit and implications for exploration in the area of the mine. I have also included a brief section on recommendations.

So far I have completed 1:2,500 scale mapping of the access road to the open pit (mostly within the mafics), and 1:500 scale mapping of the lower benches, together with the 1420 metre level and critical portions of the 1370 metre level. The 1400 metre level was inaccessible at the time of mapping due to road construction. Face mapping at 1:250 scale was carried out along the southern part of the 1350 metre level.

This mapping session proved to be quite slow due to a combination of factors - my lack of familiarity with the local and regional geology; the need to establish current survey control and a suitable base map; access problems inherent in the mapping of a producing open pit mine. Certainly, some of these factors can be remedied and I expect that my monthly sessions will be increasingly more productive. Ideally, I would like to produce face maps for each bench at 1:250 scale and then compile these at 1:500 scale in order to produce the final plan for any given month. Nevertheless, I feel satisfied that we have made a good start.

My understanding of the desired end result of this project is as follows:

1. To produce a detailed three dimensional model of the Sam deposit that will include:

   (a) the character and distribution of the mineralization, alteration and lithologic units;

   (b) the distribution and orientation of major structures such as faults and folds and small-scale structures such as bedding, schistosity,

crenulation cleavage(s), fold axes, and slip surfaces;

2. To integrate this model into a northeast-southwest cross-section that extends from the hanging wall mafics at Sam to the foot wall of the Rea deposit. This cross-section would obviously be considerably enhanced by diamond drill hole information between the two deposits.

The availability of survey information for all geological stations will facilitate construction of a 3-D computer model (using autocad) of the Sam deposit.

STRUCTURAL AND STRATIGRAPHIC SETTING OF THE SAM DEPOSIT

My initial observations are listed below:

1. The mineralization that is presently exposed on the 1320 and 1330 metre levels is clearly associated with veins that predate the schistosity - these veins are isoclinally folded and boudined.

2. In general, the veins are subparallel to the schistosity, but in detail tend to have dips that are slightly shallower, other than along the southwest margin of the ore zone where the veins are intensely folded. Most of these folds are southwesterly verging and plunge at 10 to 30 degrees toward the northwest. This is contrary to the orientation of bedding/schistosity intersections and small-scale folds of bedding, which plunge shallowly toward the southeast (in agreement with the inferred plunge at Rea). This indicates that most of the veins had an initial orientation at an angle to bedding prior to the development of the schistosity.

3. Zones of sericite development coincide closely with the distribution of pre-schistosity quartz veins and are interpreted to represent early potassic wall-rock alteration which was subsequently regionally metamorphosed to produce the sericite that now defines the schistosity.

4. On the 1320 and 1330 levels, early barren quartz veins and associated sericite schist occur in the structural hanging wall of the ore zone and continue into the overlying mafic sequence for several tens of metres. To the southeast, along the 1340 level, the ore zone appears to pass laterally into barren quartz veins hosted by sericite schist. Further to the southeast, from the 1350 level to the 1370 level these veins and their associated sericitic alteration haloes become progressively less abundant.

5. The footwall contact of the mineralizing system is sharply defined. On the 1350 level, the contact is slightly

steeper than the bedding, although it does not appear to be a fault. On the 1330 level tightly folded interbeds of argillite and siltstone are truncated by mineralized veins along the footwall of the ore zone. Here, the contact may be a fault or may simply represent veins that cross-cut the bedding at a high angle.

6. Southeast of the ore zone, there are no obvious epigenetic features such as cross-cutting quartz veins close to the "muddy tuff" to indicate that this unit is an alteration product of argillite. Here, it is separated from the vein system by unaltered argillite and siltstone interbeds. The strike of its upper contact appears to be parallel to bedding and therefore stratigraphic in nature. As such, it is interpreted as an exhalative horizon, in agreement with previous workers. The "muddy tuff" meets the vein system on the 1330 level, close to the present southeasterly limit of the ore zone, although the unit itself is not apparently mineralized. I think that this is a critical spatial association and may prove to be an important exploration guide.

7. Bedding planes are only consistently recognizable within the unaltered sediments in the footwall of the vein system. Here, they generally dip at shallow to moderate angles toward the northeast, although some small-scale asymmetric folds are evident. The sense of asymmetry of these folds, together with bedding-cleavage relationships show that this part of the sequence is on the northeast limb of a (first phase?) antiform to which the penetrative foliation is axial planar. This implies that the sequence is upright, although no stratigraphic tops were found to prove this.

8. Thrust faults associated with the first recognizable phase of deformation (i.e. the schistosity) do occur locally at contacts between lithologies of contrasting competence, for example the mafic/sediment contact, but do not appear to represent major displacments.

9. A weak crenulation cleavage is developed locally, particularly close to quartz veins. It generally strikes toward the northwest, but so far no consistent pattern has emerged with respect to its dip.

10. Northeasterly trending late faults that dip at shallow to moderate angles toward the southeast cut the vein system, particularly along the 1340 and 1350 levels. Displacement vectors recorded by fibrous mineral growth and slickensides on the surface of these faults indicate dip-slip movement. The sense of motion could only be confidently ascertained along one of these faults. Here, the movement was down to the southeast, i.e. normal. So far, my impression is that none of these faults represent major displacements of the ore zone.

INITIAL IMPRESSIONS ON THE GENESIS OF THE DEPOSIT

1. The vein system and associated ore zone are epigenetic in character, but their emplacement preceded the first recognizable phase of deformation, as represented by the schistosity.

2. The muddy tuff is syngenetic in origin and probably represents an exhalative horizon (perhaps laterally equivalent to the Rea Horizon).

3. Juxtaposition of the muddy tuff unit and the vein system on the 1330 metre level at the present southeast limit of the ore zone may indicate the point at which a "black smoker" broke surface. It is possible that most of the mineralization was precipitated close to (but not on) surface in the upper portions of the vent, which is now represented by the Sam deposit itself. This may indicate that the rate of sedimentation in the immediate area of Sam precluded deposition of a stratiform deposit.

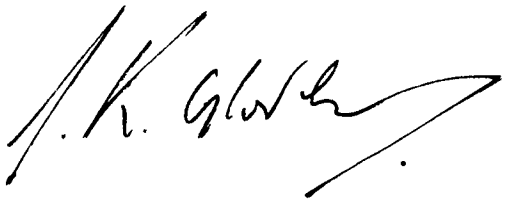
4. This model requires that the deposit and enclosing stratigraphic sequence are overturned, and appears to contradict the evidence from bedding-cleavage relationships. However, this could possibly be explained by overturning prior to the development of the schistosity. The fact that the deposit does not cross-cut the mafic-sediment contact appears to be a more serious objection.

RECOMMENDATIONS

I think that the return from this project could be vastly improved if detailed (1:250 scale) face mapping along each bench was completed on a more frequent basis than my once-a-month time allocation allows. I am sure that one or two days a week, preferably on weekends, would do the trick. Emphasis should be placed on the structural and lithological characteristics of the vein system and enclosing stratigraphic units. If a suitable person (Kerry?) could be freed for one or two days a week so that this project can better keep up with the development of the pit, then my brief spells at Sam could be optimized by helping with critical areas and problems.

It would be extremely helpful if the current survey control for the pit area could be keyed into the distribution of outcrops and flagged along each bench prior to each detailed mapping session. Perhaps this could be done for the appropriate areas on the Thursday and/or Friday of each week as part of the routine survey tasks.

Respectfully submitted,



J. Keith Glover

Geological Consultant