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To: Ian Pirie

Copy: Alex Davidson; Al Hill; Bob Friezen

From: Keith Glover

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My recent visit to Sam was mostly occupied by a re-evaluation of our present understanding of the deposit, in conjunction with Jim Clark and Willie Brown. This included a visit to the pit, the 1330 Crosscut (only the Sam Mafics were exposed), the Rea trenches, and the Homestake Bluffs, as well as going over core from the immediate area of the deposit, recent exploration holes (including the recent gold zone) and several Rea holes. We also visited the Homestake camp where we had the opportunity to look at core from the Twin property that included some of the deeper holes which contained complete sections from the Sam Mafics to the hanging wall turbidites of the Rea sequence.

Several new ideas and variations of old ideas came out of the many "brainstorming" discussions we had.

1. The ore sequence at Sam is defined by the Sam Sediments, at the base, comprising variably siliceous argillite, chert, heterolithic fragmentals and mafic volcaniclastic sediments (the Middle Mafics), and by the stratigraphically overlying distal turbidites that vary from wackes to laminated argillite. The Sam Horizon is defined by the contact between the Sam Sediments and the overlying turbidites and represents a profound change in the depositional regime and provenance. Debris flows and soft-sediment deformation, localized along or close to this contact, indicate that this change was accompanied by tectonic instability within the basin. Furthermore, some pervasive, fine-grained grey pyritic sericite that occurs within the matrix to these debris flows, could be diagenetic, especially where it occurs in the absence of quartz veins or significant silicification. This lithology is commonly accompanied by anomalous precious and base metal values and points to a period of mineralization that is broadly coeval with sedimentation.

2. At this point, there seems to be little doubt in anybody's mind that the Rea lenses are exhalative and therefore syngenetic in origin. The Rea Horizon is remarkably similar to the Sam Horizon, both in terms of gross lithological succession and detailed lithologic characteristics. This indicates that they belong to the same stratigraphic succession, and may either be time-equivalent

or represent a repetition of similar conditions within the basin, with respect to tectonic activity, depositional regime and mineralization.

3. Yellow sericite-bull quartz vein mineralization overprints most of the grey sericite-silica mineralization

4. The ore zone and its associated alteration haloe(s) crosscut stratigraphy. This is particularly evident in the case of the silver grey sericite-pyrite ore, which is hosted by both turbidites and Sam Sediments.

5. There may be two (or even three) periods ef mineralization at Sam:

(a) A regionally stratabound, geochemically anomalous zone of precious and base metals were deposited diagenetically (?) on or near the Sam Horizon and was accompanied by silver-grey sericite-pyrite alteration. This period is at least broadly coeval with the age of the host rocks and the Rea lenses. This model can be tested by comparison of radiometric dates from samples of grey sericite taken from the matrix of heterolithic fragmentals from the Sam Horizon and from the Rea Horizon (as far away as possible from any quatz veins).

(b) A later epigenetic period of mineralization that occurred after lithification and possibly during the early phases of penatrative deformation, but prior to thrust faulting. Most (if not all) the silver was introduced during this period. There is evidence for two phases of epigenetic mineralization:-

    (i) an early phase that was accompanied by pervasive silicification and phyllic alteration (grey sericite-pyrite) of the wall rocks; and
    (ii) a later phase in which discrete bull quartz veins were emplaced. These veins are associated with selvages of yellow sericite and generally coarser grained pyrite. Comparative radiometric dating of the yellow sericite and the grey sericite from the ore zone may give distinctly different results if these two phases of mineralization belong to separate events.

Approximately one day was spent going over the core from the underground drilling program. Jim and I mapped out the major lithological contacts in core from most of the available holes along section 96 + 30 W and compared the revised section with the geology from the 1330 crosscut. Core from underground drill holes along section 96 + 20 W was also inspected, but somewhat cursorily. Insufficient time was available to really do justice to the amount of

sub-surface information that now exists in this part of the deposit, but the following features became clear as a result of this exercise:

1. There is no doubt that the ore zone defines a synformal closure with a very much attenuated and thrust-faulted upper limb. In cross-sectional view, the axial trace of this fold is more or less parallel to the thrust faults along the upper limb, especially at the deeper structural levels, although some of the hanging wall faults, especially the major thrust, appear to become progressively steeper and diverge away from the ore zone in an updip direction. Along the 1330 Crosscut, the upper limb is represented by a fault-bound massive sulphide/quartz vein that is hosted by grey sericite. This fault zone forms the footwall contact to altered Middle Mafics and can be traced on section in a downdip direction. At depth, close to the hinge zone, it diverges from the upper limb of the ore zone.

2. The mineralized zone that defines this closure does not appear to follow the turbidite/Sam Sediment stratigraphic contact. On section 96 + 30 W, this stratigraphic (?) contact was traced from U1330-1 to U1330-4, where it lies 12 to 16 metres structurally below the mineralized zone along the lower limb of the synform. In U1330-74, the next hole down-section, the contact moves to the upper part of this mineralized zone. This coincides with the downdip transition from dominantly yellow sericite-bull quartz vein ore to grey sericite-silica ore and indicates that the ore zone is strongly discordant where this transition takes place. It also implies that the footwall thrust fault, which has been recognized in the 1330 Crosscut and in the open pit throughout Phase 1 Mining, may not have significant displacement along it, because this stratigraphic contact is crossed in both the hanging wall and the footwall of the fault between these two holes. Small-scale folding toward the lower part of the turbidites in U-1330-4 suggests the existence of another fold hinge at a deeper structural level (or possibly part of the same hinge zone complex).

3. Relatively narrow cross faults displace stratigraphy abruptly within the Sam Mafics, but the width of these faults increases within the ore sequence where they tend to "leak" along and merge with the thrust faults. This is graphically displayed in the pit and in Section 96 + 30 W, where the upper cross fault displaces the lower contact of the lapilli tuff unit by about 25 metres but merges with the thrust fault that defines the base of the Middle Mafic unit.

In detail (1:250 scale), we have an extremely limited understanding of the structure and stratigraphy in the area of the ore zone, its immediate footwall, and downdip as far as the RG 85/86. Given the fact that there is a

demonstrable post-ore thrust fault of unknown displacement in the immediate footwall of the ore zone, I dont think we can afford to ignore the potential that footwall offsets of the ore body may offer. This is especially the case in areas where holes end in yellow sericitic alteration below the ore body. Admittedly, this potential looks limited on the 1:1,000 or even 1:500 scale sections, but considering the present size of the underground ore reserves, a third of which lie within a wide brittle cross fault, surely this footwall potential requires more investigation. I am convinced that much more relavent information can be gained from the underground drill core, and I would have thought that there is a certain amount of urgency in acquiring this information. Unfortunately, my present obligations in California make it impossible for me to revisit Sam in the near future, but perhaps someone else (Jim?) is available.

Respectfully submitted:

J. Keith Glover

Geological Consultant