

**Initial Response Letter
for the
Homestake Deep Underground Science and Engineering Laboratory
December 2, 2005**

**Controls on World-Class Homestake-type Gold Mineralization:
Stratigraphic and Structural Reinterpretation in
Selected Areas of the Homestake Mine, Lead, South Dakota**

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Description of Proposed Program:

For the 125 years of geologic studies at the Homestake mine, mapping has been undertaken on a formation basis, using key minerals as indicators of formation distribution. By “connecting the dots”, the overall structure in the mine has evolved, based on assumptions that there is only one “Homestake Formation” Only recently (T. Campbell, Ph.D. dissertation, in progress) has there been an attempt to map lithologies in order to better constrain stratigraphic relationships, and preliminary studies have shown that several iron formations are present in the mine. This places a question on previous structural interpretations, including controls on ore body distribution.

Currently, Melissa Campbell (M.S. student in Geology, SDSMT) is completing a detailed lithostratigraphic study at a scale of 1:1200 across the Homestake mine area at the 4850, 5900 and 6800 levels, utilizing existing core, maps, etc., and the initial work of Tom Campbell. This work is supported by a grant from Barrick Gold Corporation. This reinterpretation is based upon examination of the extensive data base composed of geologic maps and cross-sections, South Dakota’s Homestake Core Repository and diamond drill hole data, data from Barrick’s Homestake Mine and Homestake Exploration data archives, the Noble ore and rock collection, the Campbell Collection of maps and samples, and Vulcan digital data.

The current work will set the framework for subsequent more-detailed studies in order to reassess the controls of stratigraphy, structure and metamorphic processes on ore body distribution in this type-example of the world-class Homestake deposit. We envision the following:

- (I) detailed lithostratigraphic study at a scale of 1:1200 across the Homestake mine area at the 4100 and 4850 levels utilizing existing core, maps, etc.;
- (II) reinterpretation, in light of the lithostratigraphic studies, of the structures in key areas of the Homestake mine, including folds, faults, steeply-dipping shear zones, and ore bodies, using underground mine map data, examination of underground exposures, and the Vulcan database;

- (III) examination of geochemical and alteration halos in the vicinity of ore bodies and structures, using existing data and new data acquired from drill core and underground exposures;
- (IV) assessment of the physical and chemical changes (volume change, element partitioning) across the garnet isograd, and its influence on Homestake mineralization, using samples from drill core and underground exposures.

Space Requirement and Technical Issues:

Initially, emphasis will be on the mine data base composed of geologic maps and cross-sections, Homestake Core Repository and diamond drill hole logs, and the Vulcan digital data base.

Subsequently, physical examination of key areas of the mine will be desirable for mapping and sampling. Selection of key areas will be based on preliminary stratigraphic and structural analysis, and on currently accessible locations underground. Likely, key levels would be the focus – e.g. 4850, 4100, 5900, 6800.

Access to the underground facility:

Initial access would be desirable by January 2007, at least to the 4850 level, and by September 2007 to the 6800 level.

Other general requirements:

None