THOUGHTS ON THE AGE OF GOLD MINERALIZATION IN THE ICEBERG GOLD DEPOSIT

RED HILL PROPERTY, EUREKA COUNTY, NEVADA

Roger C. Steininger, PhD., CPG

February 18, 2015

SUMMARY

The historic geological interpretation for gold mineralization in what has become known as the Iceberg deposit was that it is hosted in 13 million year old basalts related to the Northern Nevada Rift, and therefore gold mineralization is younger than 13 million years. If that were the case then the mineralization in the underlying carbonates might be of a similar age. Since the large Carlin-type gold deposits in the Cortez area formed 35 to 40 million years ago, the implication is therefore that mineralization related to a young event could reduce the size potential of the Iceberg deposit. Although, it is also possible that two ages of gold mineralization exist; a younger age in the basalt and an older Carlin-type in the carbonates beneath the volcanics, this is not known in Nevada.

New evidence suggests that mineralization in the volcanic rocks at Iceberg was misinterpreted and the mineralized volcanics are part of a 35 million year (Eocene) old dacite and volcaniclastic sequence. This new interpretation argues for a single mineralizing event that formed at about the time as other Carlin-type gold deposits in the Cortez area. Therefore, it is concluded that Iceberg is a typical Carlin-type gold deposit. The question is how large and what grade is the gold deposit? This will be answered with additional drilling.

DETAIL GEOLOGY

Gold in the Iceberg area was historically regarded as mineralization in Miocene basalt, similar to that at Buckhorn and Mule Canyon to the northwest. Drilling by previous explorers also identified minor amounts of gold in the underlying Devonian carbonates. NuLegacy's (NUG) drilling has expanded the known distribution of gold in the carbonates, which has all the characteristics of a Carlin-type gold deposit (CTGD). This raises some significant questions. Are there two ages of gold mineralization, an older CTGD in the carbonates and younger mineralization in the overlying volcanic rocks, or has there been a discovery of a "young" CTGD, and does it make a difference? If the gold mineralization in the volcanic rocks (assuming they are Miocene) is of the same generation as gold in the carbonates that implies that the CTGD mineralization is much younger than similar deposits in the Cortez area. Since there are no known "young" CTGDs this would probably greatly reduce the potential for a large gold deposit at Iceberg. Yet another possibility is that the geology of Iceberg needs to be reinterpreted, i.e. the volcanic rocks in the upper part of the drill holes may not be Miocene. These questions can be addressed, but mostly by extrapolation. By their very nature CTGDs do not contain materials that can be used to directly determine the age of the mineralization. Geologists have had to use igneous rocks (which are commonly dateable) that pre-date mineralization, those that seem to be mineralized, and those that post-date mineralization as the basis for backing into the age of CTGD mineralization.

Researchers are getting closer to an agreement on the age of CTGDs, but there are still differing opinions.

Muntean, et al, (2011) concluded that CTGDs in the Cortez district developed about 35 million years ago (Ma). The only known igneous rocks that have been dated in the Red Hill area are those published in McKee et al, 1994. The basalts on the ridge to the west of Iceberg are part of the Northern Nevada Rift and have been dated at 13.0±0.5 Ma. There is a dacite flow that is part of a volcanic/volcaniclastic sequence in the western part of the property that was dated at 34.8±1.0 Ma. These dates present a few additional questions. Are the volcanics at Iceberg the down-dropped extension of the basalts to the west, or an older volcanic unit? Are some of the highly altered volcanic rocks at Iceberg related to the dacitic sequence to the west? This discussion presents my interpretations of the geology at Iceberg and the age of its gold mineralization.

NUG's drilling at Iceberg is focused on gold mineralization in sedimentary rocks below the volcanic rocks, which are up to 400 feet thick, and has identified a CTGD that is referred to as the Iceberg deposit. This mineralization occurs in the Devonian carbonates of the Horse Canyon Formation and underlying Wenban Formation; the two principal hosts for the Cortez area gold deposits. Mineralization is mostly stratabound replacement in the carbonates, with lesser gold in the overlying volcanic rocks. The alteration assemblage associated with this mineralization is typical CTGD; silicification, argillization, added barite, and decalcification. Within and surrounding the gold mineralization is a characteristic CTGD trace element assemblage including arsenic (>100 ppm), antimony (>20 ppm), mercury (>1 ppm), and anomalous thallium. The alteration, style of mineralization, and geochemistry of the Iceberg deposit is characteristic of a CTGD.

In contrast, typical Miocene basalt hosted gold mineralization of the Northern Nevada Rift is low-sulfidation epithermal style (John, et al, 2003). Three common characteristics of these deposits are an abundance of adularia, significant silver, and low barite concentrations. None of these features are associated with the mineralization at Iceberg.

In many places above the Devonian rocks is a unit that has been historically referred to as "Tertiary sediments", above which are volcanics that have been historically referred to as basalt. Both of these units also contain gold. When most of the historic exploration occurred the Devonian Horse Canyon Formation had not been identified.

The proper identification of these latter two lithologies is at the crux of the age of mineralization question. In most of the drill holes that encountered the "Tertiary sediments" the rock is so intensely altered that it impossible to identify the original characteristics of this unit. In a few areas that are somewhat less altered NUG's relogging of available historic drill chips, and the NUG drilling, has determined that the unit is most likely Devonian Horse Canyon Formation. Therefore, some, or all, of this unit may not be Tertiary and therefore old enough to host 35 Ma gold mineralization. Above the "Tertiary sediments" historic logging categorized the volcanics as "basalt". NUG's drilling makes that determination questionable. McKee's descriptions, and NUG's observations, suggest that the rocks in the upper part of the drill holes have a different characteristic than Miocene basalts exposed to the west

and in part at Iceberg. In several of the NUG drill holes the volcanic unit contains what appear to be altered relic feldspar phenocrysts, which is not characteristic of the rift basalts, and interlayered volcaniclastics.

About three miles to the west of Iceberg McKee, et al (1994) identified a dacitic unit which consists of volcanic dacite flows, likely to contain feldspar phenocrysts, and numerous intervals of sedimentary breccia that contains abundant clasts of volcanic material, and volcaniclastics. One of the dacite flows in the upper part of this unit was dated at 34.8±1.0 Ma. To the east this unit is covered by Northern Nevada Rift basalts. It is interpreted that this sequence extends into the Iceberg area, and that is what has been misidentified as intensely altered basalt and "Tertiary sediments" in the historic drilling. Therefore, mineralized volcanic rocks at Iceberg are part of this 35 Ma sequence. This interpretation also removes the need to down-drop the basalts during the last 13 million years to account for the thickness of volcanics at Iceberg. The significant impact of this interpretation is that the mineralization at Iceberg is hosted in rocks of about 35 Ma, and older, indicating that the mineralization has an age similar to the CTGDs of the Cortez area. There is a thin (few tens of feet) veneer of Miocene basalt covering part of Iceberg, but it is not known to be mineralized. Therefore, the principal question is how large of a CTGD deposit formed and what is the grade of the mineralized zone? This will be answered with additional drilling.

CONCLUSION

Obviously more work is needed to solidify this hypothesis, but it is likely that there is one age of gold mineralization at Iceberg and it is typical of the 35 Ma CTGDs in the Cortez area. This also implies that a large gold deposit can exist in the sedimentary rocks under volcanic cover that has all of the characteristics of a CTGD and that NUG's drilling has only encountered the "tip of the iceberg".

Dr. Roger C. Steininger, CPG, NuLegacy's Chief Operating Officer and a qualified person as defined by National Instrument 43-101 *Standards of Disclosure for Mineral* Projects has prepared the scientific and technical information contained in this paper.

REFERENCES

John, David A., Hufstra, Albert H., Fleck, Robert J., Brummer, Jon E., and Saderholm, Eric C., 2003, Geologic Setting and Genesis of the Mule Canyon Low-Sulfidation Epithermal Gold-Silver Deposit, North-Central Nevada: Econ. Geol., V. 98, p. 425-463.

McKee, Edwin, and Conrad, James E., 1994, Geologic Map of the Northern Part of the Simpson Park Mountains, Eureka County, Nevada: U. S. Geological Survey Map MF-2257.

Muntean, John L., Cline, Jean S., Simon, Adam C., and Longo, Anthony A., 2011, Magnatic-hydrothermal origin of Nevada's Carlin-type gold deposits: Nature Geoscience, V. 4, p. 122-127