Geophysical Reinterpretation to Identify New Drill Targets **of** the Round Top Cu-Mo-Ag Deposit, Illinois Creek District, Western Alaska

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Often, when a geophysical survey is acquired, a basic interpretation is performed, and drilling immediately follows. Then the geophysical data are filed away and forgotten. In the case of the Round Top Project, Western Alaska Copper & Gold Co. and Zonge Engineering have partnered to revisit the 1981-84 geophysics – review old data, reinterpret and reintegrate, and compare to new data acquired in 2010. Using 3-D visualization of geophysics, geology and geochemistry, the data from the early 1980's have been reinterpreted, the new zones of interest have been identified, as well as providing correlation to known mineralization. This paper will focus on the re-modeling of the induced polarization data integrated with surface geology.

Located in the Illinois Creek Mining District, Kaiyuh Mountains of western interior Alaska, the Round Top Cu-Mo-Ag deposit is near the village of Kaltag, approximately 60 miles south of Galena and 18 miles east of the Yukon River. See Location Map, Figure 1. Initial discoveries in the district by the Anaconda Minerals Company in 1980 included the Illinois Creek Au-Ag deposit, the Round Top porphyry Cu-Mo-Ag deposit and the Honker high grade Au-Ag vein system.

Regional Geology

The south-central Kaiyuh Mountains are a subdued mature range of rolling hills and meandering rivers. The entire region lies south of the Kaltag Fault, a major northeast trending strike slip fault with right lateral offset of up to 100 km. Topographic expression along the fault indicates that some recent movement has been dip-slip. Many topographic linears in the Kaiyuh Mountains are interpreted to be parallel fault splays or otherwise related to this structure. The Kaiyuh Mountains are comprised of three distinct geologic terrains: 1) an older lower Paleozoic schist terrain that contains quartzite, dolomite and carbonate units; 2) a Jurassic sequence of mafic intrusive and volcanic rocks and undifferentiated sediments; and 3) intrusive rocks which include a Cretaceous granodiorite/quartz monzonite (Kgr, 113 m.y.) around Khotol Mountain and Early Tertiary (72.9 m.y.) felsic intrusives at Round Top.

History and Previous Work

Large surface FeOx gossans were discovered west of VABM Round Top along the contact of an altered mineralized porphyritic intrusion with Paleozoic quartz muscovite schist. Initial assay results from the gossan contained values of 0.49% Cu, 2.4% Pb, 1.3% Zn, and 4.3 opt Ag. Previous work included a large exploration program initiated in 1981 with 1,668 meters of diamond drilling, geologic mapping, and geochemical/geophysical programs. A period of intense exploration in the Illinois Creek District occurred between 1981 and 1984 that included the construction of a 50-man camp and a 4200 foot C-130 Hercules/DC-6 capable airstrip. Two new structurally controlled Ag-Pb-Zn prospects, Tim's Gossan and TG North, were discovered in 1981-82 adjacent to the Round Top porphyry deposit. Extensive geochemical sampling along with ground and airborne geophysical surveys were also completed. Total District expenditures through 1984 totaled $10.5 million. The Illinois Creek Mine was placed into production in 1997 by US-MX/Dakota Mining Company and operations continued until 2002/03 when it was closed due to low gold prices.

Historical Geophysical Program

A large, integrated geophysical program at Round Top during 1981-82 included 114 line kilometers of ground magnetics, gravity, horizontal loop EM and induced polarization surveys. This included 13 km over 5 lines of pole-dipole Resistivity and IP data over the Round Top Project, and one dipole-dipole line in 1982. Regional magnetic and gravity surveys were used to define the extent of buried granitic rocks. A total of 5000 line miles of low level aerial magnetic survey was completed by ERTEC Airborne Systems in 1981. Both of these surveys indicate that the Round Top prospect is at the northern limit of a pluton that measures several kilometers across and is part of a larger buried batholith (C. Hrabak, 1982).

In 2010 we have continued our efforts to reassess the extensive database of geology, geochemistry, drilling and geophysical data that was created in the 1980's and to apply modern methods to the data in order to better understand the complex hydrothermal systems of mineralization of the Round Top Cu-Mo-Ag porphyry system. In 2010, the original 1981 data was successfully digitized and reprocessed with information from the 1981 geophysics report. Issues that were dealt with include: very bad coupling in some areas – data was removed from the 1981 data, a pole-dipole configuration where the transmitter 'infinite' was kilometers away to the east, creating a current perpendicular to the line, and the survey lines originated at the top of the ridge, then read to the north, returned to the top, then to the south, on the downslope, resulting in an unknown array geometry.

After reprocessing the data with modern software, inverted model Resistivity and IP sections were evaluated and interpreted and compared to the original geologic and geophysical conclusions. The newly modeled 1981 data was compared and contrasted with the original interpretations, to see if the zones were still valid. These older pseudo sections are a valuable resource for the application of modern 2 Dimensional Inversion Modeling techniques.

Figure 2 (Line 69800E) shows a Resistivity low in the center of the section that outlines the West Lobe Quartz Latite Fragmental (QLF) unit. A sharp boundary and/or contact is indicated on the south edge of this Resistivity low. A possible sulfide conductor that correlates with the intrusive/schist contact is on the north edge. This is a new target for drilling. A small conductor at 7700N may be part of a fault zone or structure.

Drill Holes RT- 4 & 5, located in the West Lobe QLF unit, are weakly mineralized. IP indicates a conductor to the south and a steep contact or possible structure on the north (Figure 3). The IP anomaly outlines the disseminated sulfides in the West Lobe. The anomaly is not limited in its depth extent. The lower limit is the limit of data and is an artifact of the modeling.

In Figure 4, Section 70500E, drill hole RT-6 intersected weak copper mineralization within the Quartz Latite Fragmental unit. A near vertical IP anomaly with a sharp northern contact is indicated 160 meters north of RT-6. The Resistivity section displays a more developed conductor that extends to depth. DDH RT-6 cuts two fault zones and a silicified breccia before bottoming in altered schist. Mineralization intersected at the bottom of the RT-6 included an interval of 3.3 meters of 108 g/T silver + Cu + Pb + 150 ppb gold. This is another target indicated by the new 2D model.

On line 70800 (Figure 5) a definite conductor is delineated by both Resistivity and IP. Here in the Resistivity section, the shallow 1981 discovery drill hole RT-2 is shown cutting the partially oxidized top of a significant sulfide conductor. RT-2 intersected three zones of Cu-Ag mineralization with grades of: .98%, 1.2% AND 1.8% Cu and 10-

20 g/T Ag over widths of 4.3 TO 7.3 meters. This cross section begs for a deeper drill hole!

Section 71400E is significant because it is the only cross section that combines known surface geology and geochemistry with sub-surface geology from two drill holes, RT-3 and RT-7 (the deepest drill hole at Round Top) and geophysical data from both 1981 and 2010. Drill hole RT-7 is shown on this section (Figure 6), penetrating to a depth of 494.3 m between two IP anomalies. RT-7 intersected significant copper mineralization with five zones of + 0.50% Cu that included 10.4 m of 0.86% Cu, 5.2 m of 1.1% Cu and 7.5 m of 0.80% Cu. For more than 360 meters RT-7 averaged 0.21% Cu. However, the IP anomaly just south of RT-7 likely indicates a higher sulfide zone within the Quartz Monzonite Porphyry than intersected by RT-7. It represents another new target

Resistivity confirms the IP anomaly south of RT-7, and also indicates a large conductor within the Quartz Monzonite Porphyry at 5950N. This correlates with both an IP and a 1981 electromagnetic conductor, and is another new target, as a result of the Zonge 2D Inversion Modeling. The Resistivity also indicates the highly resistive quartz stockwork zone that extends from the surface just north of RT-7 and is also cut at depth.

3D Visualization

By using 3-D visualization of geophysics, geology and geochemistry, the data from 1981 have been reinterpreted, the zones of interest have been identified, as well as providing correlation to known mineralization. Several new targets for drilling have been identified as a result of this work.

Summary and Target Generation

By partnering with Zonge Engineering, historical IP data has been combined with modern computerized geophysical modeling techniques and with geology and geochemistry to better identify new drill targets. In summary with this new information, the Round Top porphyry Cu-Mo system is a drill ready prospect with multiple follow-up and step-off targets including; 1) a large porphyry Cu-Mo system south of the East Lobe is defined by a pronounced aeromagnetic high anomaly and IP data, 2) Cu-Ag-Pb-Zn skarn based on both surface outcrop, both EM and IP geophysical data and sub-surface drill intercepts in RT-2 and 7 and localized by the NW tending structure along the north side of the Round Top intrusive system, 3) Volcanic-"muffled" hypogene mineralization at depth and below the Quartz Latite Fragmental in the West Lobe (Riedell, 2010), 4) a "Bonanza style" Ag-Pb-Zn structurally controlled vein/breccia mineralization localized by large NW tending structures in the TG and TG North areas and 5) a "blind" hydrothermal high grade Cu breccia target at the East Lobe.

Several detailed and untested targets have been produced by Zonge's modern 2D Inversion Modeling of old 1980's numerical geophysical data. These targets, along with several others at Round Top that have not yet been surveyed with geophysical methods are shown in the last illustration, Figure 7.

References

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