Thermally Speciated Mercury in Mineral Exploration

Shea Clark Smith

Minerals Exploration & Environmental Geochemistry
P.O. Box 18325, Reno, Nevada, U.S.A. 89511
SheaClarkSmith@compuserve.com

Presentation Poster at the IGES 2003 in Dublin, Ireland

Platosa Project, Durango, Mexico

Abstract

The Platosa property is located 5 kilometers northwest of the town of Bermejillo in the north-central Mexico state of Durango. In late 1999, speciated mercury soil gas (GAS'm) was used to expand the lead-zinc-silver Platosa discovery owned and operated at that time by Apex Silver Mines Ltd. Nine GAS'm anomalies were generated by the initial survey, and three of these were drilled. Two of the holes intersected ore grade mineralization 150 meters east of the original discovery hole. Grades of 24-74 opt silver, 4-25% lead, and 3-17% zinc over 5-1 meter intervals (respectively) were reported on July 5, 2000. This was the first reported discovery of a new resource based on GAS'm technology.

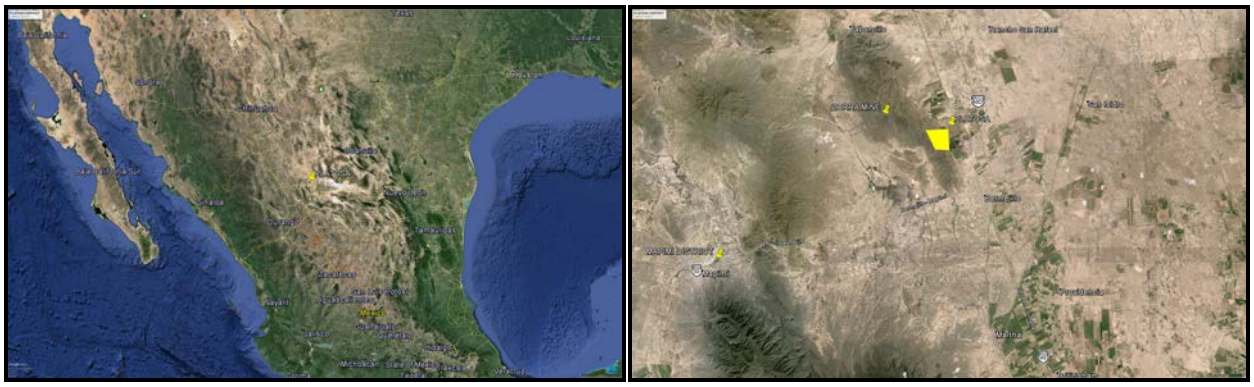

Fig 1. Location of the Platosa Project, Durango, Mexico, about 5 Km northwest of the town of Bermejillo.

Introduction

Many base and precious metal ores are associated with mineralizing events that include hydrothermal circulation around thermal cells. Mercury is one of a suite of metals that is associated with this contemporaneous and late hydrothermal activity. As mineralizing solutions cool and the associated metals are deposited, a spatial relationship is created where mercury and the other metals can be used as geochemical pathfinders in the search for these ores and related geothermal occurrences.

Unlike more traditional soil gas methods, GAS'm relies on the extreme volatility of bio-methylated mercury species for the detection of deep mineralization. Microbial activity at the ground water / mineral interaction zone creates a plume of molecular mercury species that travels

vertically to the surface, where clays, oxy-hydroxides, chlorides, humates, and other reactive soil constituents act as traps. Gentle heating of the soil sample releases the most volatile mercury species, and these volatile species reveal the deepest metal sources. More aggressive heating releases the more refractory mercury species, and these more commonly relate to structures. When the suite of molecular species is compared, overlying patterns can differentiate mineralized and un-mineralized structures. Relationships revealed in these patterns create a vector to deep metal, which can guide further exploration to the source.

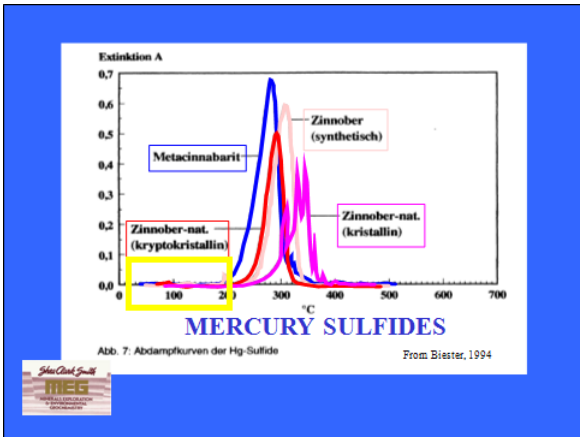

Fig 2. Sulfides of mercury (cinnabar) showing various thermal decomposition temperatures. GAS'm desorption temperatures explore the release of molecular mercury below 200C.

GAS'm Survey Results

The Platosa property lies in a thick sequence of late-Mesozoic carbonate platforms, which overlie mid-Mesozoic clastic sequences that in turn overlie a rifted metamorphic basement of Precambrian, Paleozoic and Mesozoic ages (Barton, et al., 1995).

Over 100 orientation samples were tested in August of 1999 using various particulate fractions and desorption temperatures. This work established the parameters (sample weight, desorption time and desorption temperature) for later analyses.

In November, 1999 over 800 samples were sent from Platosa for GAS'm analysis. These were desorbed at one temperature below 200 C for several hours. The results were reported on Apex Silver's website a few months later:

"Drilling results based on GAS'm mercury soil gas data from the Platosa Project, 5 Km northwest of Bermejillo, Durango, Mexico, were reported on Apex Silver Mines Ltd. website in July and October, 2000. Nine soil gas anomalies resulted from a 300m x 300m grid on 10 m centers, three of which were drill tested."

"A new ore zone was discovered approximately 130 m from their 1999 Discovery Hole (PL-99-05), and 350 m from the old Platosa workings. One mercury anomaly relates to ore grades of 74 opt Ag, 25% Pb and 18% Zn averaged over an interval of 1.1 meters (PL-00-23). A second hole in that same anomaly averaged 24 opt Ag, 4% Pb, and 3% Zn over an interval of 5.2 meters (PL-00-25). Depth to this manto ore is 124 - 132 meters in dolomites that are overlain by thick sequences of barren limestones and dolomites and up to 10 m of unconsolidated alluvium."

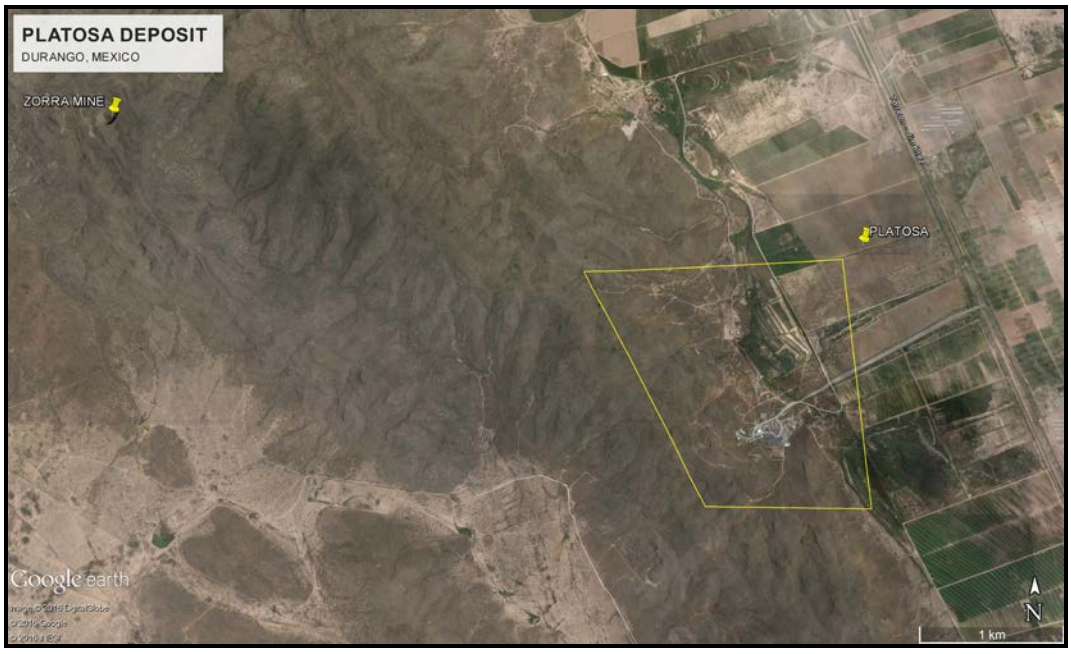

Fig 3. Location of Platosa Project, showing drill activity (ca 2000), and relationship to the historic Zorra Mine.

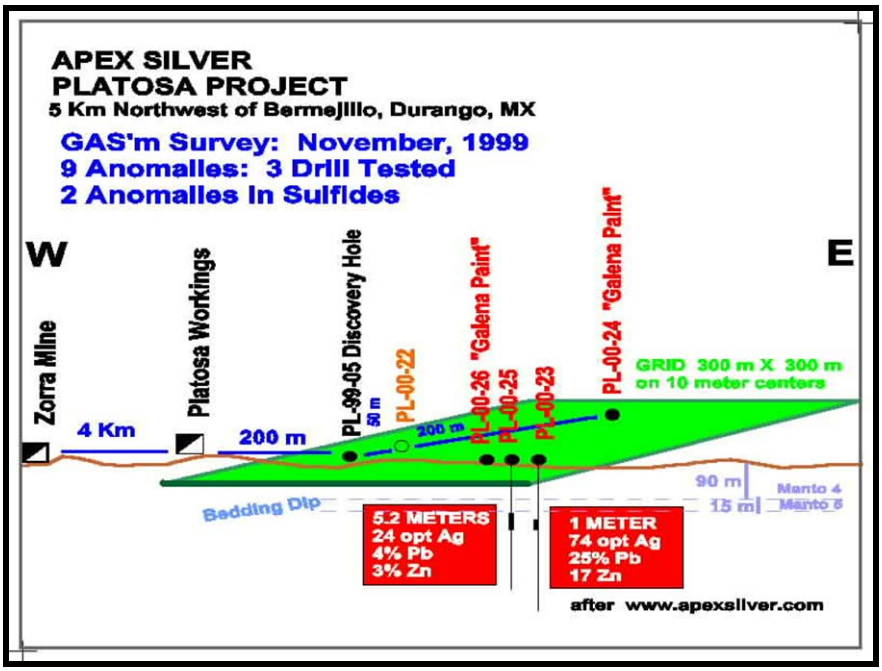

Fig 3. Diagrammatic illustration of the Platosa Project, showing drill results based on GAS'm anomalies.

“A second GAS’m anomaly was drilled (PL-00-24) that encountered “galena paint” in Manto 4 and Manto 5, about 90-105 meters from the surface. Diamond drilling on a third, very robust anomaly encountered no sulfides, but based on geographical and geological relationships, it was deemed worthy of more drill testing at some future time, since it may indeed lie at the western edge of this new ore body that is still open to the east and south.”