

GAC CORDILLERAN SECTION

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Exploration Series “Early Stage Active Projects”

Wednesday, May 03, 2017

8:00 am: Registration – Networking

8:20 am: Presentation begins

Discovery Center, Geological Survey of Canada

1500 - 605 Robson Street, Vancouver, BC

Cost: \$5 – Pay at Door – Coffee & muffins provided

RSVP: space is limited; please pre-register by email at: talks@gac-cs.ca

The Royal Mines of Zacualpan Ag-Au District, Central Mexico

Untangling complex structure through GIS & a summary of current mining operations

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The Royal Mines of Zacualpan form arguably one of the oldest modern mining centers of the New World, with the “Royal Mines” designation given in 1532 by King Ferdinand of Spain through Hernan Cortez. At the time of Cortez’s arrival at Tenochtitlan in 1519 (now known as Mexico City), gold and silver mining was known to the Taxco – Zacualpan – Sultepec Belt of west-central Mexico. The local indigenous gained their knowledge of metals through contact with the Bolivian-Peruvian people beginning around 650 AD. Cuauhtemoc, the

Aztec ruler of Tenochtitlan, was from the Taxco region and personally directed Cortez to this region. The town of Zacualpan was incorporated in the year 1527, making it one of the oldest Spanish based communities in Mexico. Miners and engineers from the Saxony region of Germany began arriving in the mid-1530’s and thus began hardrock mining in the mainland portions of North and South America.

With a “modern” mining heritage of almost five hundred years the 400 km² Zacualpan District is richly endowed with old mine and exploration workings. Over 4,850 tunnels, shafts, pits and trenches have been identified to date, with more being found on a weekly basis. As well, some 75 old processing plants are known, which roughly define some twenty-one mining camps. When Impact Silver began their mining and exploration in 2005 it quickly became apparent that the easiest way to find the silver-bearing veins was simply to find the old mine workings. In fact out of the fifteen hundred known silver or gold bearing veins, all but five have had evidence of prior mining or exploration activities.

Another thing that greeted Impact’s exploration team in 2005 was the equivalent of some three small buildings chock full of old maps. The only obvious means of dealing with this abundance of information, (which some have characterized as “Data Overload”) was a Geographic Information System (GIS) such as ESRI’s ArcMap. Initially much time was spent trying to determine what sorts of information we had, what information could be of use, and how it should be portrayed efficiently and effectively. Eight years later after some 48,000 rock samples, 86,000 soil samples, 16,000 rock outcrops, 7,000 Diff GPS survey points, half a dozen geophysical surveys, and 2,345 drill holes

with an additional 73,500 assays had been accurately inputted, a methodology to synthesize and make sense of all this was then needed.

Simplistically to find a mine the attributes that are needed to clearly stand out on a map would be: 1) the value of the rock, 2) the width over which those values occur, 3) the length of the structure hosting those values, and/or the widths, 4) the location of the structure, plus the 5) continuity of the metal values and widths. Other refinements that can be incorporated into an enhanced "In Ground Metal Value" for the rock could include: 1) the dollar value for multiple paying metals, 2) mining dilution factors, 3) mill recoveries, 4) smelter payments and any penalties. Now to find a format in which all these attributes can be portrayed on just one map? For this reason it was decided to plot the surface traces of the veins in "Vein Segments", with each corresponding to the strike length between samples, and incorporate the assay data for the rock and drill hole sample databases. Sounds pretty straightforward and easy so far...

However with the topography around Zacualpan being semi-mountainous, and the calculations to accurately plot the surface trace for "Vein Segment" taking a considerable amount of time, compounded by the fact that we had some 124,000 rock and drill hole samples this became an industrial process that required automation. In a flash of inspiration it was decided to ask our in-house GIS expert (Behroz Behnam) to write an add-on program to ESRI's ArcMap that would automatically plot the surface trace to within an accuracy of one metre for a given "Vein Segment" using structural contours. As a refinement another program was created to calculate the weighted averages and automatically combine this information with each of the digitized "Vein Segments" on our GIS map. Now having all this information at one's fingertips all that remains is to select which colours one wants for the different attributes of the veins, and start finding mines.

The attribute table data for the "Vein Segments" can also be ranked, or selected by grade, dollar value, or "dollar value time's width" to highlight the most promising veins. As well weighted averages along strike using multiple "Vein Segments" for a particular vein can be interactively calculated in ArcMap for a given interval to determine continuity or other economic parameters. In addition the shapes of the higher grade "Vein Segments" can be easily selected and examined in conjunction with the neighboring "Vein Segments" and/or adjoining vein relationships to determine if a particular orientation, or bend to the right or left, change in dip, and/or variations in width have a specific relationship to the higher grade "Vein Segments". These relationships can then be used to highlight places of undiscovered potential.

Other aspects of this talk will include the metal zoning patterns for the Zacualpan Veins using these "Vein Segments" for the regional trends and individual structures, plus a preliminary unravelling of the structural evolution of the Zacualpan District. As well there will be a brief look at some of our better upcoming exploration targets, and a capsule summary at IMPACT's operating mines along with what strategies may be in store for the future development of Zacualpan District.

A summary of the work and results, intended to stimulate discussion of future efforts on the project, will be presented.