

The Université Laval – INRS-ETE SEG Student Chapter situated in Quebec City, Canada, held a geological field trip (Feb. 28th to March 10th 2003) in the Mexican Silver Belt. The participants to the excursion (9 BSc, MSc and PhD students) wanted to learn more about the metallogeny of this particular region characterized by Ag-rich base metal deposits mainly hosted by Lower Cretaceous sedimentary rocks. Following discussions with Mr. David A. Giles of Penoles (SEG regional V-P North America), a tour going from El Paso through Chihuahua to Zacatecas was organized.

This tour began with a visit of the Geology department of University of Texas at El Paso guided by Dr. Phil Goodell who also introduced us to the Basin and Range geology. It continued with a meeting in Chihuahua University (UACH) where Mr. Giles and Dr. Miguel Franco gave an introduction to Mexican geology and where we met UACH SEG Student Chapter members and Faculty.

Our tour included visits of the San Antonio mine (Eastern Santa Eulalia district) near Chihuahua, the San Diego mine (Santa Barbara district) near Parral, the Penoles area, the San Martin mine near Sombrerete, the Fresnillo mine in Fresnillo and the Madero mine near Zacatecas. Two exploration geologists from Penoles accompanied us during the tour; Ing. Oscar Comaduran for the first part (Santa Eulalia, Santa Barbara and Penoles area) and Ing. Fernando Pineiro for the second part (San Martin, Fresnillo and Madero). Their generous help was especially appreciated and we greatly benefited from their unique knowledge of the Mexican geology.

The San Antonio mine, owned by Grupo Mexico, comprises two types of ore (mantos and chimneys) clearly related to normal faulting (San Antonio west graben fault) and Tertiary felsic dykes and sills within Lower Cretaceous limestones as demonstrated by Ing. Mario Ramirez Oveido, the geologist leading the U/G tour.

The San Diego mine, also owned by Grupo Mexico, is comparable to the

other mines of the Santa Barbara district: large N-S main veins (ex.: Coyote Vein) and smaller NE-SW veins composed of Ag-rich Zn-Pb sulfides. These veins, hosted by the carbonaceous shales of the Parral Fm could be related to Tertiary felsic dykes as shown by Mr. Porfirio Perez and Mr. Guillermo Caballero (mine geologists).

Two different types of veins separated by a late N-S fault are present in the Penoles area as shown by Mr. Oscar Comaduran during a surface tour of the property. The first ore type (west of the fault) is characterized by shallow-dipping E-W quartz and Pb-Zn-As sulfides veins related to early faults in a thin-bedded sequence of limestone, shale and chert exhibiting skarn textures. The second ore type (east of the fault) is composed of E-W Au-Ag epithermal veins related to Tertiary volcanics overlying the sedimentary host rocks.

The San Martin skarn deposit, owned by Grupo Mexico, is hosted by Lower Cretaceous limestone where replacement zones are associated to veins (faults) parallel to the 40 My old Cerro de la Gloria granodiorite. The ore is composed of Zn-Pb massive sulfides and Ag-rich Fe-Cu massive sulfides closer to the intrusion. Some amazingly Ag-rich zones (common native silver) associated to massive bornite-chalcopyrite are present locally as showed by Mr. Elias Torres and Mr. Jorge Sanchez.

The world-class Fresnillo deposit operated by Penoles is the world second largest silver producer. They are now mining major epithermal veins part of an E-W system hosted by Cretaceous volcano-sedimentary rocks. We observed the astonishing San Carlos vein which is about 3 to 5 meters wide and at least 4 kilometers long and composed of crustiform-banded quartz and Ag-Au-Zn-Pb-Cu sulfides and sulfosalts. Geologists Alvaro Martinez, Manuel Ambriz and Victor Menchaca clearly demonstrated the multi-stage hydrothermal veining related to ore deposition.

Finally, the Madero deposit owned by Penoles, the biggest Zn producer of

Latin America, is characterized by massive Zn-Pb sulfide lenses overlying a large massive Fe-sulfide lens at the interface between footwall argillites and hangingwall carbon-rich limestones. As explained by mine geologists Pablo F. Gurrola and Luis A. Machuda and by Mr. Fernando Pineiro, evidences points toward a sedimentary exhalative (SEDEX) origin for the formation of the deposit.

This excursion permitted to the participants to familiarized with a large spectrum of Ag-Zn-Pb ore types hosted by Cretaceous sediments and related to Tertiary tectonism and magmatism. It was made possible through support by Penoles (David A. Giles) and Grupo Mexico (Julian Chavira). We also gratefully thank our sponsors: the Society of Economic Geologists, Université Laval (Département de géologie et de génie géologique), INRS-ETE, SOQUEM, AESGUL, AEGGUL, SODEMEX, the Mineralogical Association of Canada (P. Tremblay), the Geological Association of Canada (B. Dubé) and Gestion Capital. And we also salute our new friends of the lately formed UACH SEG Student Chapter and thank Gerardo Perez Reveles and Ing. Rodrigo Aguilar who arranged the meeting in Chihuahua. A special thank goes to Mr. David A. Giles who kindly arranged all the mine visits, to Dr. Phil Goodell for his assistance during the tour and to Dr. N. Pinet for his precious help.

For more details about this excursion and upcoming activities, please visit our website at:

www.ggl.ulaval.ca/Aeggul/seg/index.html.

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