INTRODUCTION TO JUNE FOCUS:
Western Canadian Mineral Exploration Geophysics
Special Coordinators: Jean M. Legault and Oliver Kuhn

Western Canada is well known for its oil and gas sector, but the minerals sector is also an important part of the resource extraction economy. For CSEG readers not familiar with the minerals sector, a closer look will reveal many parallels with the oil and gas world: dramatic up and down swings in the prices for mineral commodities such as gold, copper, uranium and potash, the use of geophysics to reduce exploration risk, the integration of different types of geospatial data, and so on. The four articles selected for this month’s focus theme feature some of the techniques being used in Western Canada to help explore for and extract minerals.

We would like to note that while the minerals geophysical sector is dwarfed by the oil and gas equivalent in terms of dollars spent, the range of methods used is arguably broader. Many quite different airborne and ground survey methods are actively being used, and these articles just scratch the surface in terms of the type of work being done.

In “How Geoscientists are Making Potash Mines Safer” authors Craig Funk, Janelle Appleyard, Jennifer Braun, and Jodi Derkach describe the use of in-mine GPR technology to reduce the risk of cave ins. The topic covered is unique and interesting in several ways. We are familiar with geophysics aiding exploration, perhaps production, but in this case geophysics is used to improve safety. The emphasis on improved HSE practices has been a prominent and positive trend in both oil and gas and mining and here is an example of how companies truly are improving safety. The article also offers insights to how intangible human factors such as cultural resistance to change are often bigger challenges than the technical ones such as involved in conducting real time GPR surveys in an operating mine.

Mel Best and Isaac Fage (“Case study of mineral deposits in the Yukon using high resolution resistivity/induced polarization techniques”) present the results of a survey test of a new multi-electrode high resolution resistivity and IP system. This innovative system application was introduced to the Yukon in 2013 for polymetallic gold deposit exploration. The HHRIP system had been in common use for environmental and engineering applications, such as mapping aggregates and groundwater leachate studies, but here it proved quite useful for mapping narrow but often very rich, near-surface (<100 m depth) vein systems that typify the Yukon mineral exploration environment. The HHRIP’s survey speed and efficiency, and its minimal environmental footprint proved superior to larger conventional IP-resistivity systems that are typically used. The original study commissioned by the Yukon Geological Survey was over nine various and known mineral deposits, but in this article Mel and Isaac focus on their test survey over the Klaza breccia gold-silver deposit in the rugged Tanana terrane near Mt Nansen in west central Yukon.

Patterson Lake South is the newest uranium camp in Saskatchewan’s prolific Athabasca Basin and the Triple R deposit is the first and largest to be discovered in 2012 by Fission Uranium, who won the PDAC’s Bill Denis award for Prospector of the Year in 2014. What distinguishes it from other uranium deposits, such as Dennison Mines’ Phoenix deposit (also presented in this issue), is both the fact that it’s situated on the western side of the Athabasca Basin, as well as being just outside the Basin, occurring in graphitic Precambrian rocks along the Patterson Lake South corridor that extends away from the Athabasca sandstone contact. In “Geophysics on Fission Uranium’s Patterson Lake South Uranium Deposit”, David Bingham, geophysical consultant for Fission Uranium, chronicles the Triple R blind discovery below thick glacial overburden using a combination of multi-parameter airborne and ground geophysics.

In a second uranium article, “Geophysics of the Phoenix uranium deposit, Saskatchewan”, Sharpe, Petrie and Stephen focus on the differences between previously acquired 2D DCIP + MT data and a recent full 3D survey. Similar to the kind of debates that were stimulated by the advent of 3D seismic, the minerals geophysics community is full of active discussions around the advantages offered by new state of the art 3D DCIP + MT surveys over more traditional 2D survey configurations.

We would like to acknowledge the contribution of Rob Hearst who also helped to coordinate these focus articles.

Jean M. Legault is a +30 year career mineral exploration geophysicist. He obtained his Bachelor’s degree in 1982 in applied science (geophysics) at Queen’s University at Kingston, ON and his Master’s degree in applied science (geophysics) in 2005 at École Polytechnique of University of Montreal, QC. He has worked in the airborne and ground geophysics service sectors since 1985. He is currently chief geophysicist at Geotech Ltd. (Aurora), a worldwide airborne geophysical service provider, where he is mainly interested in airborne geophysical methods as geological mapping tools in mineral exploration. He is co-chair of the SEG Mining Committee and member of the SEG, ASEG, SAGA, EAGE and KEGS.

Oliver Kuhn is currently President and CEO of Quantec Geoscience Ltd., a global geophysical service company specializing in ground DCIP and MT surveys. Prior to 2014 he worked in seismic processing, mainly in Calgary plus stints in Singapore, New Zealand and Australia. He is a past president of the CSEG (2006), and former editor of the RECORDER.