The analysis of the Platinum Group Elements (PGE) requires the analysis of a large sub-sample for homogeneity purposes. For routine mineral exploration, usually the most cost-effective technique is to analyze gold, platinum and palladium.

**Rocks and Soil**

For rocks and soils we suggest our Code 1C-exploration package which uses a lead fire assay collection on 30 gram samples using silver as a collector. After cupellation of the lead fire assay button, a silver doré bead results. The silver doré bead is dissolved and the solution is read by ICP/OES or ICP/MS for better detection limits. This fire assay procedure is only applicable to Au-Pt-Pd. For the analysis of rhodium (Rh) a separate fire assay is performed using gold as a collector. The resulting gold bead is dissolved and analyzed by ICP/MS.

For lake bottom sediments we suggest our Code 1C-research package as lower detection limits are required.

Once the presence of the Pt and Pd are verified with the lower-cost techniques above, a nickel sulphide fire assay procedure followed by INAA (Code 1B1) and ICP/MS (Code 1B2) is recommended. This will provide knowledge on the entire PGE suite and will verify that the lead collection procedure is working properly. PGE mineralization is commonly found to occur with Cu, Ni sulphides and/or chromite mineralization. These elements sometimes affect the Pt and Pd recovery with the lead fire assay. Results have been shown to be lower by more than 50% of the corresponding nickel sulphide collection. Multi-element packages which include Cu, Ni, Co, Cr, S, As, Sb, Se, Te, Bi and MgO as well as other trace elements are also quite useful for the discovery of the PGE-bearing deposits.

**Vegetation**

Plants have the ability to absorb and concentrate chemical elements from the ground. Biogeochemistry is a proven viable and cost-effective tool for mineral exploration, capable of locating obscured mineralization, by depicting accumulations of elements which are characteristic to a particular deposit.

The use of vegetation for PGE exploration has been developed by Dr. Colin Dunn. However, this method suffers from only being able to see the really anomalous Pt, Pd values. With the old analytical techniques, values in the single to double digit ppb levels could be obtained but reliability suffered from a host of interfering elements which had to be corrected for. In many cases the correction was extreme, making reliability tenuous.

Actlabs has developed methods to determine PGE on dry vegetation or ashed vegetation using special digestion processes. This, combined with separation technologies and high resolution ICP/MS measuring technologies allows us to determine the PGE family of elements at the sub-ppb levels on dry vegetation. Clearly this is orders of magnitude lower than other existing technologies.
PGE minerals occur in very low abundances and usually with very fine grain sizes. The PGE minerals are either associated with gangue minerals, or they are locked in the other co-existing ore bearing minerals.

Three questions must be asked before commencing the ore processing of PGE minerals:
1. What are the associated gangue minerals? And what is the liberation of PGEs regarding these associations?
2. How much of PGE minerals are locked and how much of the locked portion can be recovered?
3. Can we engineer an improvement to PGE recovery knowing its mineralogy?

The answers have a direct effect on the ore processing and the expected recovery. Applied mineralogy is the key to answer these questions, which can provide extensive information for improving recovery of the PGE ores.

Actlabs’ Automated Mineralogy department is equipped with technologically advanced instruments, FEG-QEMSCAN, FEG-MLA and XRD, which enables us to provide a prompt and comprehensive ore characterization which can be used by our Metallurgy Department to help you progress from exploration to development.

Our Metallurgy department uses a range of minerals processing and hydrometallurgical techniques to tailor a cost-effective beneficiation process to optimize your mining investment.