APPENDIX 8

Quality assurance and quality control

It is important that geochemical procedures and assay results should be critically assessed, and that quality controls—plus any implied or imposed limitations—should be understood. Aspects to consider are: sampling procedures, sample preparation, along with analytical accuracy and precision.

The degree to which a sample can represent a larger volume from which it is extracted is a fundamental question. Sample size, its degree of mineral homogeneity, particle size and sample collection method are all important criteria to consider and monitor.

Contamination between samples or sample intervals can be a problem during RAB and percussion drilling. This can occur by abrasion of the drill-hole walls (RAB), as well as sample residence time and mixing in the drill line (can produce 'smearing' of high element values over apparently broader intervals). Reverse circulation (aircore and RC) avoids contamination from hole wall spalling, but there may still be some mixing of residual material in drill rods, circulation hoses and the cyclone collector. Additional sources of sample contamination during preparation or storage may come from using inappropriate metal riffle splitters, sieves, sample trays or containers or may involve airborne dust in areas around operating mines and ore/mullock storage sites.

Bulk drill chips and pulverised cuttings can be sampled with a sample spear/pipe inserted across the whole volume (several times) or by splitting using a riffle splitter. Drill cores can be selectively halved or quartered, where representative portions are retained for later reference or additional testing. When combining samples from different intervals to make composites it is important to maintain equal sample size (weight).

Persons doing sampling need to maintain sample hygiene protocols to avoid inadvertent sample contamination; this applies at primary, secondary and tertiary sampling stages. To achieve this, samplers should remove all metallic jewellery from their hands, wrists and neck (or places likely to be accidentally touched), and hands should be washed before sampling. Zinc-based sunscreens can cause appreciable contamination and samplers should avoid any perspiration coming in contact with a sample. This is a critical protocol where low detection limits will be applied (e.g. 1 ppb to ppt Au and Pt group elements, Ag and biota assays). Nitrile or latex gloves are used routinely in vegetation sampling.

Assay quality control and repeatability can be achieved through use of strategically placed sample duplicates, replicates and standards (at every 20th or 30th sample in a batch). In this way, an assessment can be made of just how representative and effective the sampling procedure and assay precision are. Sample standards provide an effective way to check on laboratory pre-assay preparation hygiene (contamination), and assay drift (within a batch or over time) at a particular laboratory (major variance, or only at detection limit). Check the facilities and practices of commercial laboratories with an inspection visit. Most commercial laboratories carry out quality control exercises using duplicates and their own internal reference standards, and will report the results, but it is advisable to include in-house standards and duplicates also. Analytical precision and accuracy should still be independently checked. For some elements (e.g. Au) it is good practice to cross-check analyses using a different analytical method (e.g. *aqua regia* digest with graphite furnace versus fire assay versus instrumental neutron activation).