Sampling coarse gold mineralisation – developing effective protocols and a case study from the Ballarat East mine, Australia

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ABSTRACT

The occurrence of coarse gold particles leading to grade complexity and sampling challenges is a common feature of many gold deposits. Poorly designed sampling protocols applied to these deposit types can lead to unacceptably high Sampling Errors. Proper sample collection, preparation and assay protocols are required to minimise this error, and hence reduce the total nugget effect. On a practical level, half core cutting of coarse gold mineralisation frequently leads to grade uncertainty given that the remaining half may or may not contain a material gold particle. This is frequently evidenced by the very poor precision between duplicate core half assays. In addition, further uncertainty is introduced where the assay of a half core sample is based on a single fire assay result. A case study from the Ballarat East gold mine in Victoria, Australia is presented, which is characterised by notable quantities of coarse gold (>50% +100-micron gold) hosted in multiple-quartz veins. Diamond drilling provides a reasonable measure of gross geological continuity at drill a spacing of 15-25 m along strike and 5-10 m down-dip. On vein development with face sampling, together with detailed geological studies are undertaken during the resource delineation phase. A number of different sampling and assay options have been trialled at Ballarat over its recent project history. The current drill core sampling protocol utilises whole core; using 2 kg LeachWELL assays after logging and photography. This contribution will present general discussion on coarse gold sampling, and then exemplify some of the issues via the Ballarat East deposit. The case study will include: gold particle size characteristics; how sampling and assay protocols have developed with time; TOS application, and how data is subsequently applied to grade estimation.