A High-Resolution Block Model of the Hamlet Gold Deposit, St Ives, Western Australia

Mark Roux, Shawn Hood,* Matthew Crawford, and Shaun Hackett

Gold Fields Australasia Ltd., Perth, Australia 6005

*E-mail, Shawn.Hood@gmail.com

Estimating contained metal in orogenic gold deposits is difficult due to the heterogeneity of its dissemination in space. The distribution of gold mineralisation can vary due to many geological factors, e.g., the geometry of an ore fluid plumbing network, the precipitation mechanism from ore fluids, or remobilization of gold due to deformation of host rocks after emplacement. These factors often lead to large changes in the nature of the mineralization over relatively short distances. In general, resource models attempt to locally represent this variation but are often limited by the data available, sampling inaccuracy and the inherent nugget of the data.

Gold mineralization prediction at the Hamlet mine has challenged resource geologists due to the variability of its ore zone scale and continuity. Here we show that by combining high quality geological mapping with resource estimation in a novel way, resource models can be created that are both more globally and locally accurate. Domaining of the <10-m scale ore bodies at Hamlet has been avoided by production geologists due to the time constraints of the mining environment; however, by analyzing the conditional probability of gold abundance against the collected geological data from drill core logging and underground mapping, combined with a probabilistic estimation approach, we are able to rapidly and accurately define mineralization domains. These results greatly enhance the representation of clustered, nuggety data in gold mine resource estimation, allowing more control from geologists and reducing unplanned dilution of stopes and reconciliation errors after ore has been sent to the mill. The method presented in this paper provides a framework for enhancing resource models in orogenic gold deposits, adding increased resolution for evaluating small, complicated domaining related to variable geology.