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KIMBERLITE PIPE MODELS: SIGNIFICANCE FOR EXPLORATION

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Kimberlite bodies typically form from multiple intrusive and/or extrusive events; these discrete events are recognizable as distinctive kimberlite phases. Differing textures, mineralogy, geochemistry and geophysical properties, and diamond grades, size populations and values characterize the individual phases. The recognition that there is a wide variation in the size and morphology of economically viable kimberlites strongly affects how to explore for, and sample diamonds from these bodies. It is important to note that all ore deposit models are conceptual, and embody the descriptive features of the deposit type, as well as an explanation of these features in terms of geological processes. This notion is certainly applicable to kimberlite pipe models. Kimberlite magmas generate a range of rocks that form a wide variety of landforms and intrusions, in many aspects similar to that generated by small volume alkali basaltic

volcanic systems. Current exploration models for kimberlite-hosted diamond deposits are undergoing significant revisions as a consequence of recent discoveries in Canada, and a re-assessment of southern African kimberlites. The relatively new (late 1990's) revision of the kimberlite pipe model into a new model that incorporated three distinct types of kimberlite pipe, with geometry largely controlled by host rock lithology is shown to be an improvement, but still too simple a model. An overview of the kimberlite models generated in the 1960's through 1990's (and still in use today), in the context of the historical data available at the time the model was generated is presented. A number of Canadian kimberlites are re-visited and reviewed in terms of these pipe models. This is followed by new ideas on kimberlite pipe models, and their affiliated geological processes, with implications and significance for the diamond explorationist.