

GeoTimer 1998 GSA Annual Meeting -- Toronto, Ontario

Abstract 50782

KIMBERLITE EMPLACEMENT PROCESSES IN THE SLAVE, NWT, CANADA

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Key words: kimberlite, emplacement, Slave, diatreme, maar

In Session 105 S06. The Lac de Gras Diamondiferous Kimberlite Field, Northwest Territories, Canada - SEG Wednesday, 28-Oct-98 AM in Room: 801AB at 10:30 AM for 30 minutes.

Abstract: Kimberlite emplacement processes are controlled by their geological setting. Two contrasting mechanisms have been repeated in space and time. The first mechanism is best known in southern African. These steep sided pipes comprise three distinctive zones (crater, diatreme, root) which formed by an intermittent intrusive-extrusive process driven by the build up of juvenile gases confined below surface when the magma ascent is impeded by temporary barriers/caps producing a closed system. The barriers/caps include numerous dolerite sills and basalts. Sudden breakthrough results in a fluidisation system which excavates and infills the diatreme. Different textures dominate each of the pipe zones. The second contrasting maar-like emplacement mechanism is best known in Saskatchewan-Alberta where shallow pipes comprise only one zone, the crater. These magmas were offered an easy route to surface through sediments which lack any barriers. This open system precluded diatreme formation. Near surface aquifers prompted phreatomagmatic crater excavation. Subsequent magmatic pyroclastic and resedimented kimberlite infilled the craters.

The Slave kimberlites can be divided into two groups. The first group includes several Jurassic-Cambrian provinces in which small pipes contain diatreme-facies kimberlite. Here the basement inhibited magma ascent sufficiently to allow southern African-style pipe formation while the lack of any igneous barriers precluded the requisite volatile build up to form larger pipes. The second Cretaceous-Tertiary group near Lac de Gras are small, steep-sided pipes which contain common resedimented volcanoclastic kimberlite. Given that such pipes are unlikely to represent explosion craters, it is suggested that they formed by similar processes to the first group. However, at the time of emplacement the basement was covered by a thin veneer of poorly consolidated sediments which must have changed the final stages of the eruption process by allowing easy breakthrough to surface. Wet sediment-magma interaction could have aided breakthrough and possibly caused the expulsion of the kimberlitic material. A combination of the two known emplacement mechanisms, therefore, may explain the formation of the unusual Lac de Gras kimberlites.

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Session 105 S06. The Lac de Gras Diamondiferous Kimberlite Field, Northwest Territories, Canada - SEG

Wednesday, 28-Oct-98 AM in Room: 801AB from 8:00 AM to 12:00 PM (Oral)

Presiding: Jon Carlson and Buddy Doyle

Discipline: Economic Geology

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|--------------|-----|-------|---|
| <u>50865</u> | 30 | 8:00 | THE ARCHEAN SLAVE PROVINCE, NORTHWEST TERRITORIES, CANADA: REGIONAL TECTONIC FRAMEWORK FOR CANADA'S FIRST ECONOMIC PRIMARY DIAMOND DEPOSITS |
| | min | AM | |
| <u>51180</u> | 30 | 8:30 | EXPLORATION AND DISCOVERY OF KIMBERLITES - NWT DIAMONDS PROJECT |
| | min | AM | |
| <u>51726</u> | 30 | 9:00 | THE DIAVIK PROJECT KIMBERLITES, SLAVE PROVINCE, NORTHWEST TERRITORIES, CANADA |
| | min | AM | |
| <u>4319</u> | 30 | 9:30 | CAMSELL LAKE KIMBERLITES SLAVE PROVINCE, NWT |
| | min | AM | |
| <u>51369</u> | 30 | 10:00 | PRIMITIVE KIMBERLITE MAGMAS FROM THE JERICHO PIPE, N.W.T., CANADA: CONSTRAINTS ON PRIMARY MAGMA CHEMISTRY |
| | min | AM | |
| <u>50782</u> | 30 | 10:30 | KIMBERLITE EMPLACEMENT PROCESSES IN THE SLAVE, NWT, CANADA |
| | min | AM | |
| <u>51477</u> | 30 | 11:00 | NEW EMPLACEMENT MODEL FOR LAC DE GRAS KIMBERLITE PIPES |
| | min | AM | |

Scheduled Session End Time: 12:00 PM Actual Ending Time: 11:30 AM

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