

## **PREGLACIAL DRAINAGE AND PLACER DIAMOND POTENTIAL IN THE NORTHWEST TERRITORIES OF CANADA**

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A preliminary reconstruction of paleo-drainage in the Slave Province at Lac de Gras area of the Northwest Territories of Canada indicates that in preglacial times, this region was drained by an east flowing river system. Reconstruction of paleo-topography permitted the placement of the main river axes onto their paleo thalwegs. Paleo-topographic reconstruction was carried out by eliminating linear erosional features, and by reconstructing surfaces to their former levels based on erosional remnants preserved throughout the Cenozoic. One of these features is a meander scar (of about 8 km radius) that crosses the Lac de Gras area from west to east. An east flowing drainage system drained the region from early Tertiary to the end of the Pleistocene. The retreat of the late Pleistocene (Late Wisconsinan) Laurentide ice was responsible for the establishment of a north flowing Mackenzie River system, and thereby establishing an Arctic drainage for this region. This was the only continental ice sheet to reach the eastern slopes of the northern Cordillera. However, it is not known at this time, how many continental glaciations may have affected the Northern Interior Plains of Canada without reaching the northern Cordillera, and without drastically changing the drainages of this area. Kimberlite pipes bearing diamonds are abundant in Lac de Gras and some pipes are being mined in this area. The emplacement of kimberlite pipes ranges from late Cretaceous to early Tertiary time (Eocene). Kimberlite pipes are topped by small lakes of Pleistocene age. Some of the pipes have been extensively eroded (60 %) and it is highly likely that placer diamond deposits occur in the region. Placer potential is suspected because of the east flowing paleo-drainage systems, of which the meander scar is a remnant. A preliminary classification of the paleo drainage using the Strahler classification (1:7 000 000 scale), indicates this portion of the drainage system to be a third order stream, and a tributary to a fourth order stream that flowed into Hudson Bay. A comparison of the drainage classification and geologic setting of the Kimberlite pipes of the Lac Des Gras region with those of the Orange River in South Africa, suggests some striking similarities. Both drainage systems have a comparable setting and both have the same stream order. Most interesting however, is that placer diamond occurrences in the Orange River are contained in fourth order streams, suggesting that the same hydraulic conditions which preserved placer diamonds in South Africa, may have been present in the Lac de Gras region. Higher resolution topographic analysis in both areas will need to be carried out. Placer potential in northern Canada is perhaps higher to the east and southeast of Lac de Gras possible as far east as Hudson Bay and the Atlantic Ocean considering that rivers drained in that direction for approximately 62 million years. It is also possible that some other minor deposits might be related to glacial deposits resulting from the reworking of surficial materials from the Lac de Gras area by Pleistocene continental ice in a northwesterly direction.