Searching for a giant impact structure in the Flin Flon ï Snow Lake area, Manitoba

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A 140 x 100 km ellipsoidal area centered on Elbow Lake, 65 km northeast of Flin Flon, Manitoba, comprises the Flin Flon ï Snow Lake VMS mining district including 29 past and currently producing mines. The deposits are arranged in two major clusters near Flin Flon and Snow Lake and two smaller óclustersô near Sherridon and Reed Lake.

The district is unique by reason of its mineral wealth in tonnage and grade of the copper ï zinc ï gold ores (past production and present resources 200 million tonnes). An ore-generating natural process would have had to process close to 300 tonnes of country rock with an average crustal copper abundance of 70 g/tonne to produce one tonne of ore. The gigantic amounts of focused energy to accomplish this can readily be supplied by an impact event, singular or clustered. To identify such an event would be a very challenging task because the impact would have been in offshore volcanic terrain. Up to the present no such events have been identified. But there are indirect pointers that leave much room for an impact event in the district. A specific volcanic rock type like icelandite tends to be spatially associated with VMS deposits. It is not clear if the icelandite formed in upper crustal magma chambers or from an impact melt.

A reconnaissance of numerous locations east and northeast of Flin Flon, around Sherridon and Elbow Lake was carried out. At Elbow Lake a circular area was defined on topographic maps and aerial photographs. It has a diameter of 3.8 km and encompasses the main Elbow shear zone under Elbow Lake. A microbreccia of granodioritic rock on Elbow Lake shows granophyric quartz feldspar intergrowth and a microbreccia sample returned a 2.5 ppb iridium anomaly. Near Flin Flon, several gabbroic breccias show a possible melt rock matrix. Hematization is common along the Missi/Amisk contact. Injections of melt or microbreccia into volcanic sediments were observed in at least two areas. Numerous volcanic sediments show intense striations, reminiscent of shatter cones but not definite enough.

The Flin Flon ï Sherridon ï Snow Lake ï Reed Lake area is well suited to show if and how normal volcanic processes can be separated from impact related processes. It can show if the immense energy of a major impact can result in ore-forming processes, how such processes work and how impact related ore bodies can be located.

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