

Mafic extrusive (flood basalt) Ni-Cu-PGEs

Province Blank

Potential:

Certainty:

Critical Elements (Assessment Criteria)	Identified	Not Identified, but likely	Unlikely	Weighting
Setting				
<ul style="list-style-type: none"> • Extensive basaltic flood volcanism related to mantle (possibly related to plume activity) and associated with, • major crustal faults and intraplate rifts • Sulphide deposits in subvolcanic differentiated tholeiitic feeder-sills (30-350 m thick) to extensive basaltic flood volcanism • • 				
Source (fluid, metal, energy)				
<p>Fluids</p> <ul style="list-style-type: none"> • Nil <p><i>Metals (including sulphur)</i></p> <ul style="list-style-type: none"> • Source of Ni, Cu, Co, PGEs – magmas from mantle • Source of S from country rocks at high crustal levels <p><i>Energy</i></p> <ul style="list-style-type: none"> • Multiphase igneous intrusive activity • Intraplate magmas derived from mantle • 	<ul style="list-style-type: none"> • • • • • • 			

Fluid/magma pathway				
<ul style="list-style-type: none"> • Feeder conduits along crustal faults • 				
Trap (any of the following)				
<ul style="list-style-type: none"> • Presence of evaporites and carbonaceous rocks in the country rocks or alternatively, sulphides in the country rocks to facilitate S saturation formation of sulphide melt in the feeder sills and scavenging of Ni–Cu–Co and PGEs • Large R factor provided by interaction between large volumes of magma passing through feeder sills containing sulphide melt – 				
Signs of mineralising process (any of the following, but if occurrences have been identified the level of certainty increases)				
<ul style="list-style-type: none"> • High sulphide content in feeder sills • Intrusion S saturated. • Heavy S isotopes of +8 to +12$\delta^{34}\text{S}$ • Feeder sills surrounded by intense aureole of contact metamorphism and metasomatism indicating prolonged magma flow • Evidence of chalcophile element depletion in overlying lavas • geochemical anomalies – pathfinder elements Cu, Ni, Cr, Co, Au, Pt, Pd, Mg, As, Hg • geophysical anomalies • Known occurrences of PGEs, Cr, Ni, Cu • 				
Age				
<ul style="list-style-type: none"> • Phanerozoic (Norilsk – Permian/Triassic; Insizwa – Jurassic) 				

• Proterozoic (Duluth – Mesoproterozoic)				
Preservation				
• Feeder zones need to be preserved				