Model 7a	Layered mafic-ultramafic intrusive basal Ni-Cu-Co
Alternative Model Name	Voisey's Bay Ni-Cu-Co – Basal segregations of sulphides in layered intrusions
Commodities	Ni, Cu, Co (major) PGE (minor)
% Global Production	?minor
% Australian Production	?<5%. Production restricted to Radio Hill (Pilbara) Major prospects: Sally Malay (Kimberleys), Carr Boyd Rocks (Yilgarn), Mount Sholl (Pilbara)
World Class Deposit Size	>100 Mt @ 1.2% Ni (Voisey's Bay total resource is 124 Mt @ 1.66% Ni; Australian deposits typically small: 1-4 Mt @ 0.5-2.5% Ni, 0.5-1.3% Cu, <0.5 g/t PGE)
World Class Deposit Examples	Voisey's Bay (Canada) Vammala Nickel Belt (Finland)-several non-world class deposits
Geological Setting	Generally small to medium-sized (1 to 5 km-thick) layered mafic intrusions (minor ultramafics) in stable Archaean cratons or in Proterozoic mobile zones
Age	Archaean to Proterozoic: 2.9-1.3 Ga: Voisey's Bay (1.3 Ga), Vammala (1.8 Ga), Sally Malay (1.8 Ga), Radio Hill (2.9 Ga)
Components:	
Source	?Tholeiitic magmas
Transport/Pathway	Near vertical feeder conduits
Trap	Structural embayments and depressions in basal contact beneath the thickest sequence of cumulates
Other	
Critical Elements	• Major mineralised intrusions are mafic/ultramafic syn or post orogenic mafic bodies in Proterozoic collisional zones, with less significant bodies in stable Archaean cratons (2). • Need early separation of unevolved mafic magmas from deep crustal reservoirs before extensive fractionation of olivines and pyroxenes depletes Ni and Cu (1). • Need mechanism for early S saturation of magmas (in conduit or during emplacement) – by crustal contamination or falling temperature of magma (1). • Dynamics of magma flow are important for deposition of sulphides, e.g. contrasts between change from narrow vertical conduits to broad open chambers (3). • To attain economic grades, massive sulphides need to be concentrated in depressions or structural embayments of the footwall contact or in feeder conduits (3). • Mafic composition of magma may be important for Ni-Cu-Co-rich, PGE-poor deposits (4). • Voisey's Bay deposit is in a large anorthositic complex many 1000s of square kilometres in area and is hosted in a troctolite which predates the anorthosite rocks (4).
Other Comments	Companies currently exploring for Voisey's Bay-type deposits

	(feeder conduits) in Proterozoic intrusions of the Kimberleys, Musgrave, ?west Gawler; Sally Malay shows many similarities to Voisey's Bay Voisey's Bay is in a large (~20,000 km^2) anorthositic complex containing extensive olivine rocks (olivine bearing anorthosites, leucotroctolites, troctolites over an area of 7,000 km^2), the Voisey's Bay intrusion is only 30 km^2. The deposit is hosted in the oldest least evolved troctolite predating extensive anorthosite intrusions. The two main lessons from Voisey's Bay are: • Magmatic Ni-Cu sulphides can occur in anorthosite/troctolite complexes previously regarded as unprospective and hence previously unprospective areas elsewhere in the world may now be prospective for Ni-Cu. • A relatively small intrusion like Voisey's Bay can have a world class magmatic Ni-Cu sulphide deposit.
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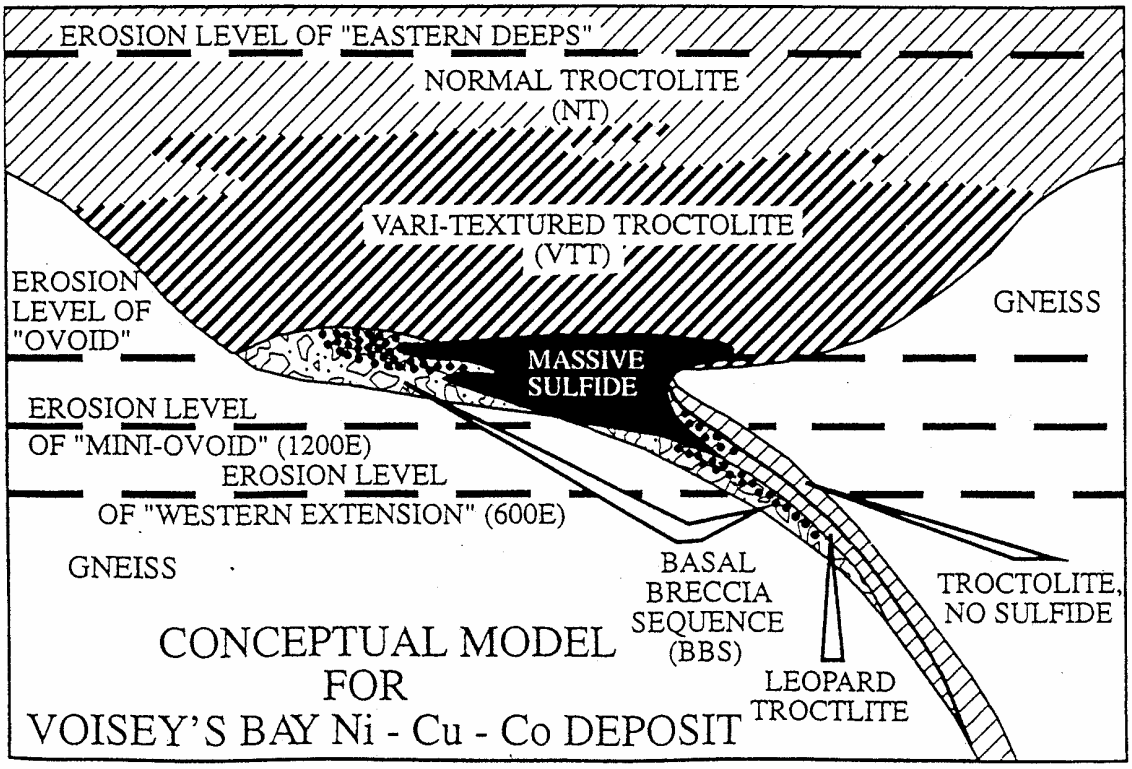
EROSION LEVEL OF "EASTERN DEEPS"
NORMAL TROCTOLITE
(NT)
VARI-TEXTURED TROCTOLITE
(VTT)
EROSION
LEVEL OF
"OVOID"
GNEISS
MASSIVE
SULFIDE
EROSION LEVEL
OF "MINI-OVOID" (1200E)
EROSION LEVEL
OF "WESTERN EXTENSION" (600E)
GNEISS
BASAL
BRECCIA
SEQUENCE
(BBS)
TROCTOLITE,
NO SULFIDE
LEOPARD
TROCTLITE
CONCEPTUAL MODEL
FOR
VOISEY'S BAY Ni - Cu - Co DEPOSIT