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**THE JOUHINEVA Co-Cu-Au DEPOSIT,
FINLAND:
1984 MINERAL RESOURCE MAPPED
INTO UNFC**

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Mapping 'historic' resources into UNFC-2019



These are non-compliant to CRIRSCO

=> Bridging document cannot be used

- No QP
- Missing description of QA/QC, if anything such was done at all
- Chemical analyses, feasibility and beneficiation studies (if any done), permitting, and references to commodity prices are outdated fully or for most parts
- Holder of the deposit has been changed since, often more than once

=> E-axis value at 3, F- and G-axis values at 3 or 4



Jouhineva Co-Cu-Au deposit geology



Host: intermediate metavolcanic rocks, plagioclase porphyrite

Main country rock: synorogenic granodiorite

Style: sulphide vein networks and dissemination

Ore minerals: Arsenopyrite + Bornite + Chalcopyrite + Cobaltite + minor cubanite, danalite, digenite, native gold, pyrite, scheelite, sphalerite, tennantite, molybdenite, electrum, hedleyite, hessite

Gangue: quartz, tourmaline, epidote, biotite, sericite, calcite, chlorite

Dimensions: A set of subparallel disc-shaped mineralised zones. The zones are defined by veins a few tens of cm to 6 m wide and 20–200 m long, NW-striking, dipping 70–90° SSW. Deposit is open along strike and plunge, to the SE and NW.

Genetic type: intrusion-related, ***sensu lato porphyry Cu-Au?*** Intense shearing => Sulphides remobilised during deformation? Depleted in Ca, K, Mg, Na; enriched in Ag, As, Au, Co, Cu, Mo, Ni, S, Te, Zn



Jouhineva Co-Cu-Au deposit exploration



1950s-1970s:

- Glacial erratic boulder survey, detailed bedrock mapping => High metal grades in boulders and outcrops
- Regional airborne magnetic, electromagnetic surveys
- Ground magnetic, electromagnetic surveys => EM anomalies detected
- Regional and targeting geochemical surveys => Regional Au, As, Cu and Sb, and local Cu-Co anomalies in till detected

1980-1984:

- 61 diamond holes, total 9,152 m, 25 m profile distance
- Beneficiation tests, test mining (5,000 t of possible ore), economic and technical feasibility evaluation, mineral resource estimated



Jouhineva Co-Cu-Au deposit 1984 resource

What was done:

Block modelling, assessment of data density as what to include into a resource and what not. Mineral resource covering the central part, with the best coverage by drilling (52 holes), open along strike and at depth

	Ore (t)	Au ppm	Ag ppm	Cu %	Co %	UNFC
Indicated Resource	73,000	0.78	21	2.20	0.19	332
Inferred Resource	377,000	0.90	5.36	0.54	0.18	333
Indicated + Inferred	450,000	0.88	7.9	0.81	0.18	333



Jouhineva Co-Cu-Au deposit 1984 resource

What was done: Drilling, block modelling, assessment of data density as what to include into a resource and what not, beneficiation tests, test mining (5,000 t of ore), economic and technical feasibility evaluation

What is not there: No QP (such definition did not exist then), no QA/QC information, no permitting (nothing regarding E-axis issues), the then owner

What is outdated: Beneficiation, feasibility studies (especially economic ones), possibly also the chemical analyses

=> UNFC 3,3,2 + 3,3,3

F3.1(?), as site-specific studies have identified a potential development with sufficient confidence to warrant further testing

F3.1 is supported by the fact that the current holder of the deposit is actively exploring it (www.europeancobalt.com/jouhineva-co-cu-au)

Challenges in mapping 'historic' resources into UNFC code (*+ some solutions*)



- ⊗ Non-compliant, i.e., **bridging document cannot be used**
- ⊗ Old reporting **documents and related data can be scanty to non-existent** => Hard to assess the quality and data density => high numbers for UNFC categories
- ⊗ Some commodities reported in an older but not in the latest resource => **Different UNFC categories in a deposit for individual commodities** (e.g., 223 + 343)
- ⊗ CRIRSCO-compliant resource >10 years ago, then the company left the prospect, the possible **new owner has not released a new resource** => Change from 221, 222, 223 to 321, 322, 323 or to 331, 332, 333 (= compliant → non-compliant resource!)
- ⊗ IM deposit: **overall resource only given, only in an EIA** => all goes into 1,2,2 or 1,3,3 (if active project or a mine, and permit granted) or 3,3,3 (if non-active and not permitted)?



More about the topic; guidelines, ways to solve issues:

Geological Survey of Finland
MTR
Espoo, Kuopio, Rovaniemi

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Open File Work Report
46/2020

Application of the UNFC resource code in Finland Practical guidelines

https://tupa.gtk.fi/raportti/arkisto/46_2020.pdf





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