Battery mineral project of Geological Survey of Finland
i.e. Government organisation reacting to rising demand

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Background

• Finnish government is investing heavily in developing the battery value chain
• All the way from raw materials through component & cell production to recycling
GTK’s budget funding
Current state

- Three mines and half a dozen mine projects have a battery "aspect"
- State-owned “Finnish Minerals Group” is a shareholder in some of the projects
Duration and size?

• 2019–2022, 2019 ~25 person years
• ~60 persons from 9 out of GTK’s 14 units
• ~1/15th of GTK’s budget funded money/time
Project in practice should/will:

- support the basis of the battery cluster
- evaluate potential, point out possibilities
  - leave exploration to the private sector
- identify new or underexplored areas
Lithium pegmatites

• Two known provinces
  • One mine project in final permitting/financing stages
• Other areas? Why not?
  • Similar structures and geological setting in ½ of Finland
Flake graphite

- Limited amount of private activity
- But:
  - Plenty of C-bearing schists and gneisses
  - Sufficiently high metamorphic degree over large areas
Flake graphite 2019

• Reporting investigated targets to ministry
• Exploration rights sold to private sector
  e.g. Rautalampi, Central Finland
• 14 holes with varying C-contents
• Best intersections:
  • 12,85 m @ 12,5 % Cg
  • 10,9 m @ 8,7 % Cg
  • 20,2 m @ 12,1 % Cg
  • 19,25 m @ 19,3 % Cg
Cobalt, 3 types regarded as most potential

- Kuusamo & Peräpohja Co-Au
  - Alteration in volcano-sedimentary sequence
- Intrusive Ni-Cu-Co
  - Paleooproterozoic mafic-ultramafic intrusions
- Outokumpu-type Cu-Ni-Co-Zn-Au
  - Altered ophiolite fragments
Kuusamo

- Continuations of the Co-Au-U potential system north from the core of the Kuusamo schist belt
- Current view is that the same rocks continue, why no known mineralisations?
  - The rocks/structures differ?
  - Underexplored?
Outokumpu West

• Outokumpu-type Co-Cu-potential in the east (altered ophiolite fragments)
• Kotalahti-type Ni-Cu-Co-potential in the west (magmatic sulphide ores)
• But what’s the practically unexplored area between these two?
  • Is it truly empty, and if, why?
  • Are the ores deeper, 3D-modelling in belt scale
Kotalahti or Outokumpu-type or something completely different?
Updated potentiality assessments

- Nationwide from cobalt and graphite
- Based on existing data
  - Deposit databases, drill cores, geochemistry, outcrop and boulder observations, layman’s samples……
- Identifying new or underexplored areas for field work in 2020
Databases, prospectivity modelling and flexi-desking make miracles,....
……, but for some people the reality is less glamorous if we want things to work.
Could it be this easy?

- Exploration project in Lapland in 1970’s
  - Was looking for Vanadium, no success
  - One sentence ”Co concentrations are however highly anomalous” in report
- Resampling the core -> up to 0.3 % Co
  - New target type for the area in question
- Old raw data often not in databases, thousands of reports to skim through
Summary

• High level commitment to decarbonisation
  • Criticality of RMs well understood by government, not always by general audience
• Role of the geological survey clear:
  • Showing potential, not making direct hits
• Are we 10–20 years late?
  • In respect to the first wave, yes
  • Exploration & permitting is just so slow
Thank you