



# New Mining Projects in Finland

**Canada – Finland Mining Opportunities Seminar  
February 18, 2010 Toronto**

Pekka A. Nurmi

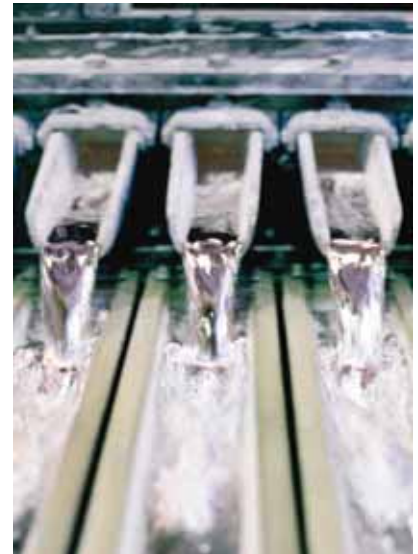
Research Director

Geological Survey of Finland



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# Gelological Survey of Finland (GTK)

- GTK is an internationally oriented geoscience research agency
- GTK research strengthens national business activity and regional development within the minerals, energy and construction sectors
- GTK plays an active role in the mineral policy in Finland and the EU
- Founded in 1886, permanent staff 625, financing € 56 million



**Our Vision:  
Geoscience for Sustainable Development and Wellbeing**

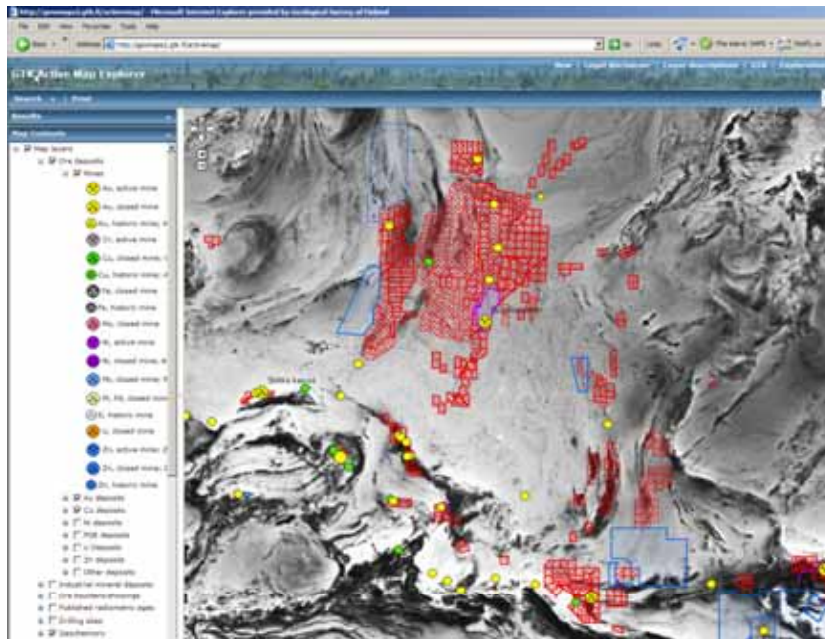
# GTK Promotes Exploration and Mining

One of the main duties of GTK is to promote the minerals sector in Finland

- Active R&D and surveying with a focus on mineral resources and their sustainable use
- Center of national geodata
- Expert services particularly to the mining sector
- Active promotion



7<sup>th</sup> FENNOSCANDIAN EXPLORATION AND MINING  
1-3 Dec 2009 • Rovaniemi - Finland



[www.gtk.fi/explor](http://www.gtk.fi/explor)

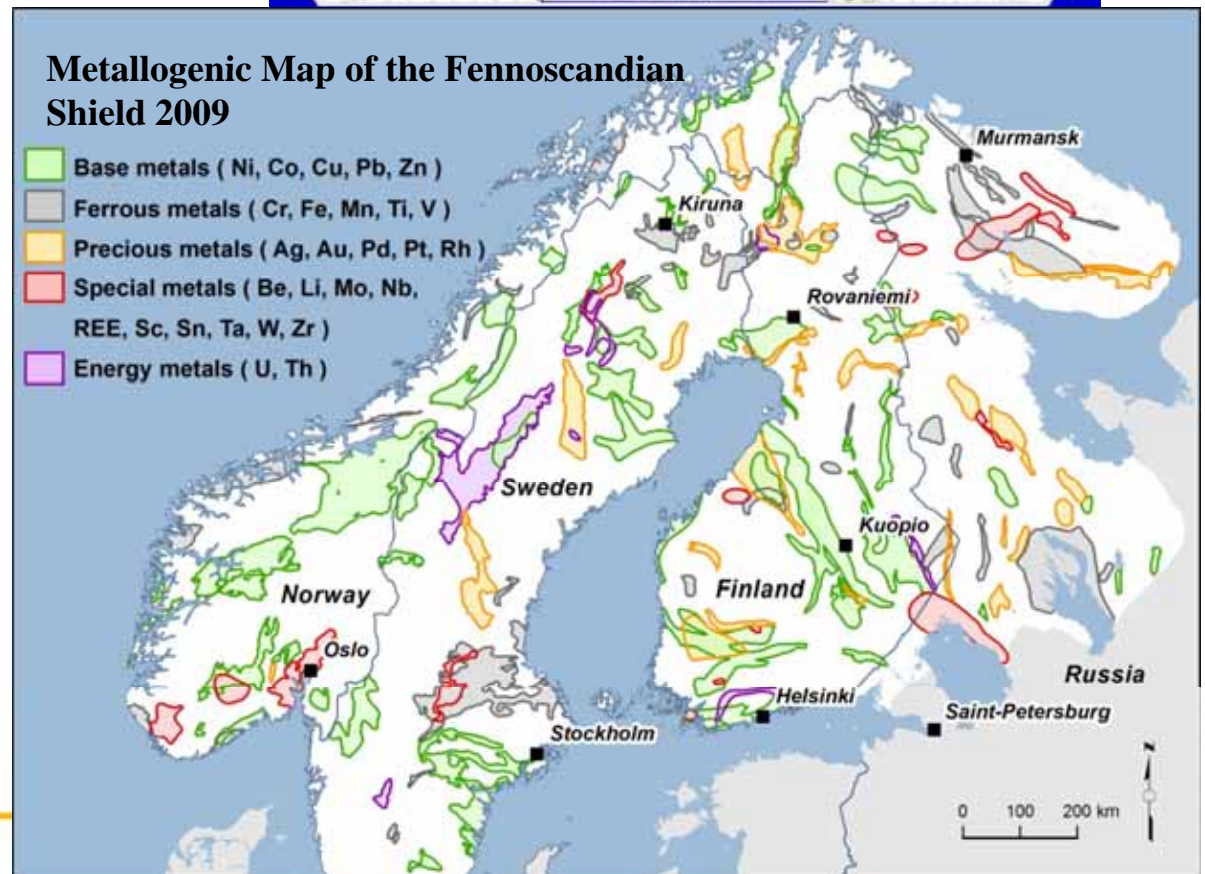
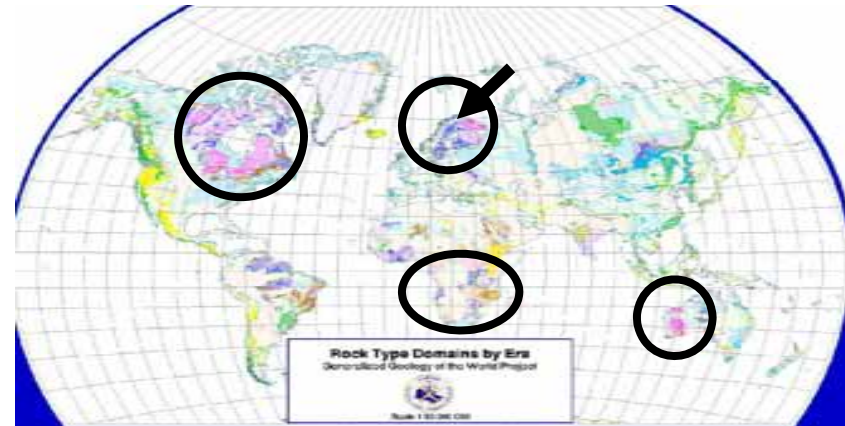


Meet us at the PDAC 2010 Booth 409!



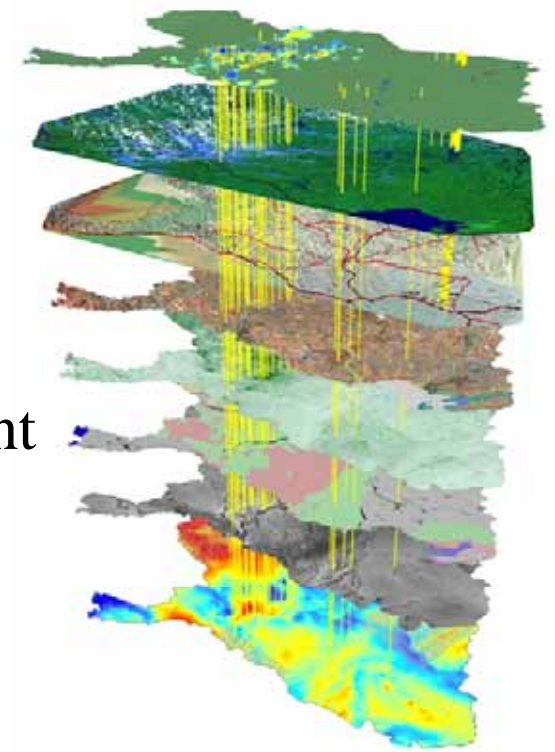
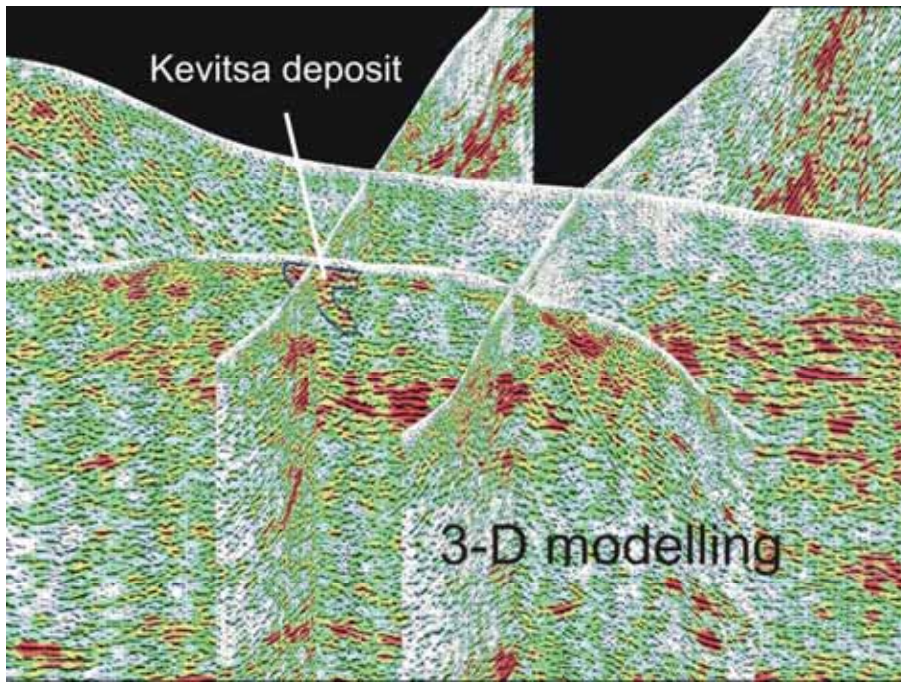
# Fennoscandian Shield - Good Potential within EU

- Precambrian shield area similar to Canada & Australia
- Long mining tradition
- Yet under-explored terrain
- Potential for many commodities
- Base metals, gold, platinum metals, iron, high tech metals, diamonds, ...



# Why Finland?

- A mining-friendly country within the EU
- Excellent geodata and infrastructure
- A favourable and secure investment environment
- Significant potential for new discoveries



# Composite Policy and Mineral Potential Ranking

## Frazer Institute Mining Company Survey 2008/09



# Active Exploration

## Canadian mining companies:

Agnico Eagle Mines Ltd.

First Quantum Minerals Ltd.

Inmet Mining Corp.

## Canadian juniors:

Adriana Resources Inc.

Belvedere Resources Ltd.

Mawson Resources Ltd.

Nortec Ventures Corp.

Northland Resources Inc.

Taranis Resources Inc.

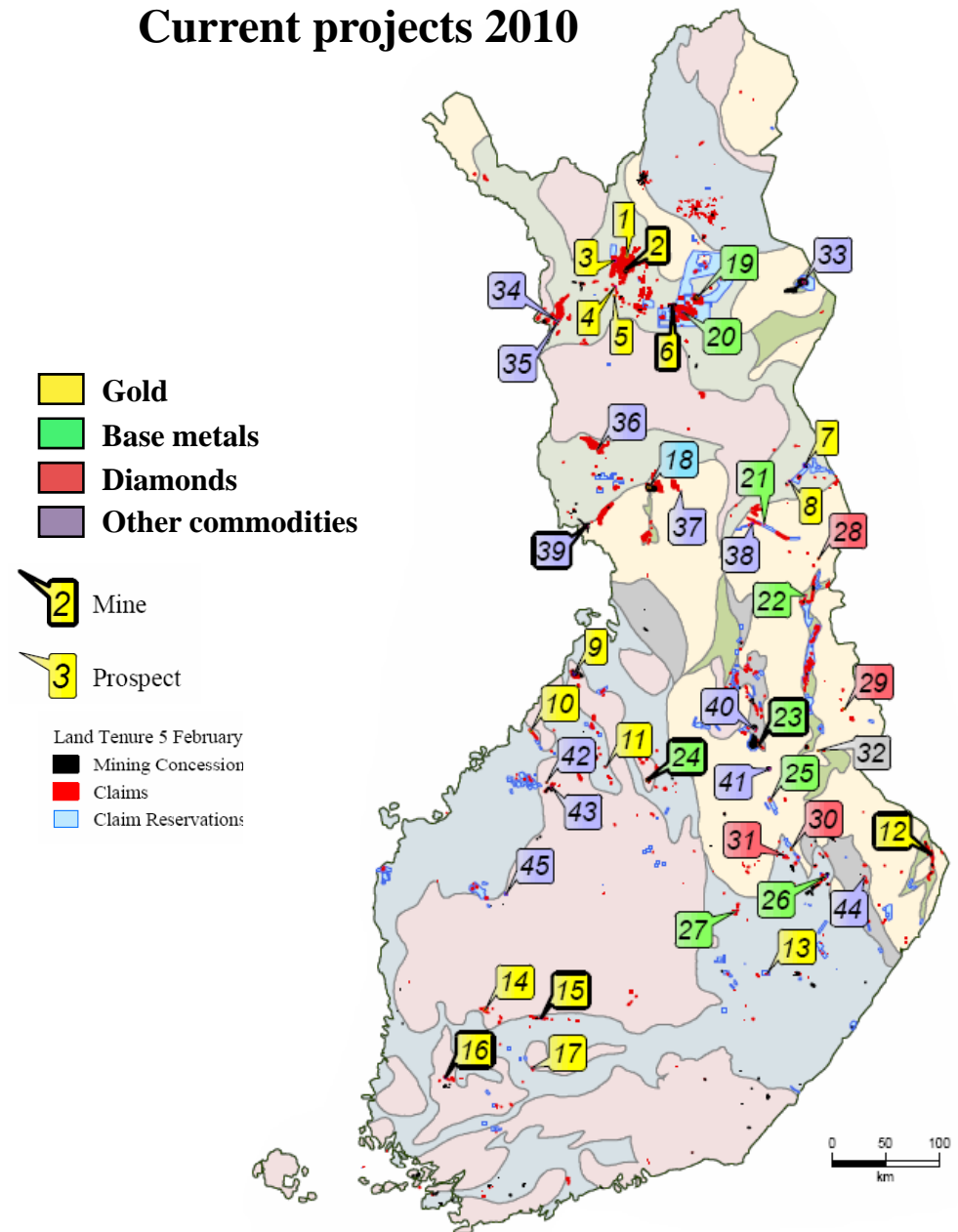
## Selected other companies:

Anglo American

Areva

Gold Fields

## Current projects 2010



# Mines and Advanced Mine Projects 2010

## Advanced projects

Kolari iron (150 mill. tons)

*Northland Resources*

Kevitsa nickel (140 mill. tons)

*First Quantum*

Sokli phosphorus (190 mill. tons)

*Yara*

Suhanko palladium (17 mill. oz)

*Gold Fields*

Laiva gold

*Nordic Mines*

Kaustinen lithium

*Nordic mining*

Kylylahti copper

*Vulcan Resources*

Jokisivu gold

*Dragon Mining*



## Operating mines

Kittilä gold, (6 mill. oz)

*Agnico Eagle*

Kemi chromium

*Outokumpu*

Pyhäsalmi copper-zinc

*Inmet Mining*

Talvivaara nickel (1000 mill. tons)

*Talvivaara Mining*

Siilinjärvi phosphorus

*Yara*



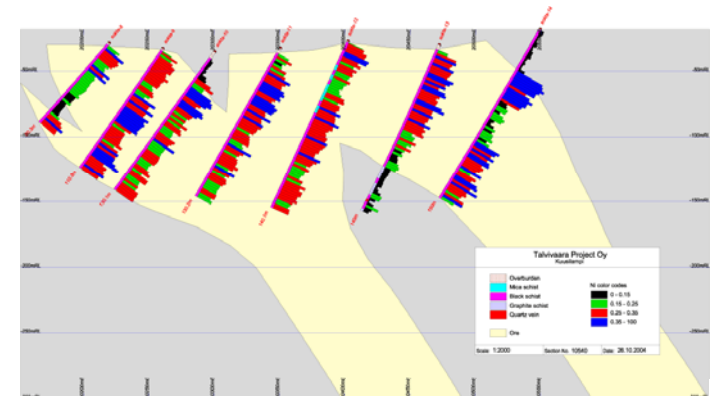
**GTK**

Pekka Nurmi Feb. 18, 2010

[www.gtk.fi](http://www.gtk.fi)

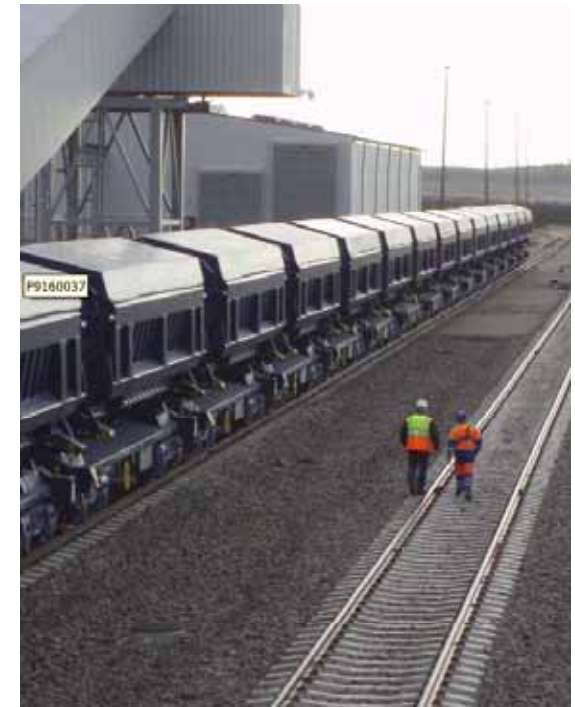
# Talvivaara Nickel Mine

- Talvivaara Mining Company Plc. (est. 2004) listed in London and Helsinki
- The largest sulphide nickel deposits in EU
- Discovered by GTK in 1970s
- Huge, low grade ore:  
1004 Mt @ 0.22 % Ni, 0.50 % Zn, 0.13 % Cu, 0.02 % Co
- €25 billion contained metals
- Ore production 24 mill. tons/a (Ni 30,000 t)
- Novel bio-heapleaching technology
- 50+ year operation



# Talvivaara's Economic Impact

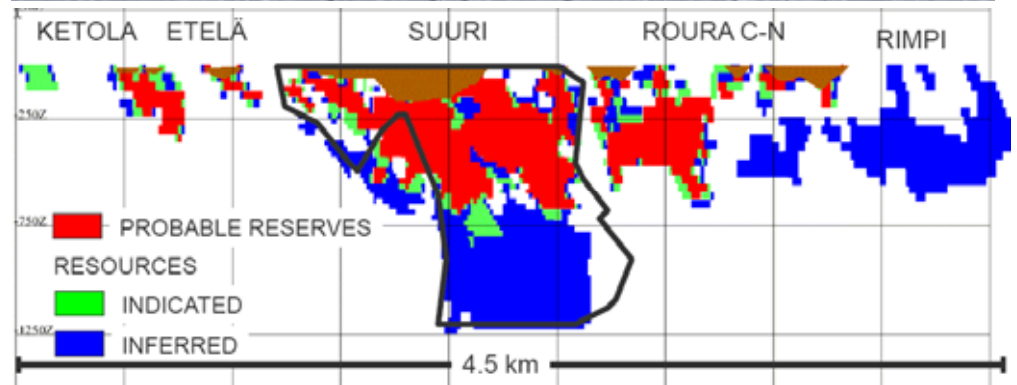
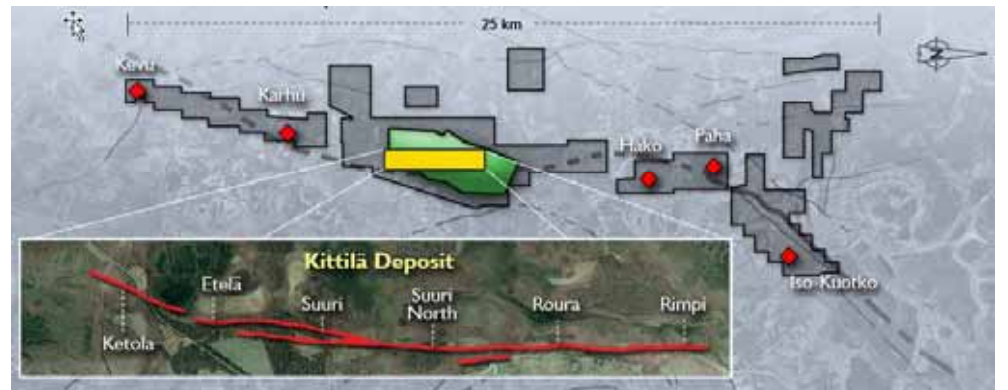
- Own capital €325 mill.
- Project Financing €302 mill.
- Initial investment €550 mill.
- Government support €54 mill.
- Annual turn over € 450 mill. (based on long term metal prices)
- Plans to increase production by 50%
- Employment: direct 430, indirect 2000
- Improves the GDP and employment of the region
- Tax revenue of the Sotkamo municipality will grow by 40%





# Kittilä Mine

- Agnico-Eagle Mines Ltd.
- Discovered by GTK in 1986
- Resources 6 M oz @ 4.5 g/t Au with excellent potential
- Most of gold in arsenopyrite
- Gold recovered by pressure leach + cyanidation
- Production started January 2009
- Initial investment €115 mill.





# Kevitsa Nickel Project

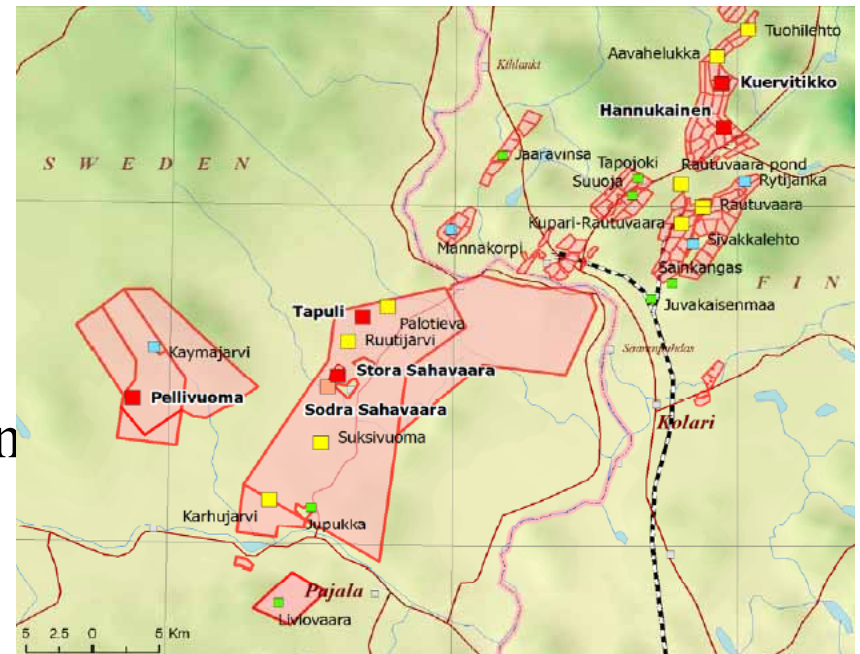
- First Quantum Minerals Ltd.
- Discovered by GTK in 1987
- 140 Mt @ 0.3 Ni, 0.4 Cu+PGE
- Planned mine start up in 2012
- Mine life over 20 years
- Initial ore production 4.5 Mt
- Initial investment € 230 mill.
- Direct employment 200 persons
- Large impact on local GDP



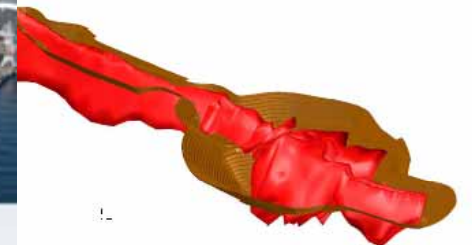


# Kolari Iron Project

- Northland Resources Inc.
- 20 deposits both in Finland and Sweden
- 500 Mt resources @ 35% Fe +Cu-Au
- Targeted annual production 13 Mt
- Production start up 2012 from Sweden
- 250 Mt @35% iron in three deposits
- High grade and quality concentrate
- Plans for a pelletizing plant
- Good infrastructure but needs investment to improve the railway and the Kemi port



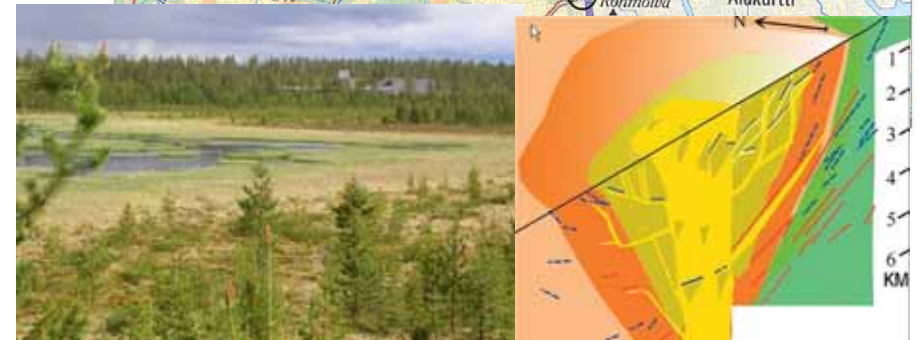
Port of Kemi, Finland





# Sokli Phosphorus Project

- Discovered in 1967
- Held by Yara since 2007
- Huge ore reserves: 190 Mt in soft and 12,200 Mt in hard rocks
- Potential for Nb, Ta and REE
- Planned production 1.54 Mt phosphorus and 0.3 Mt iron concentrates
- Investment €600 to 1000 mill.
- Direct employment 200 people
- Production start up earliest in 2015



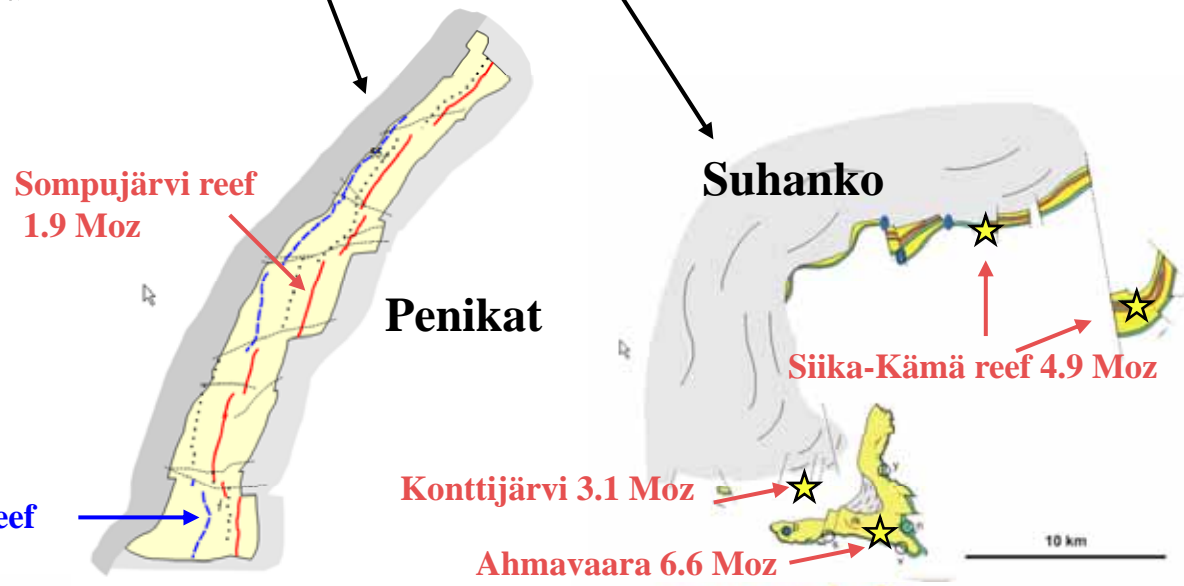
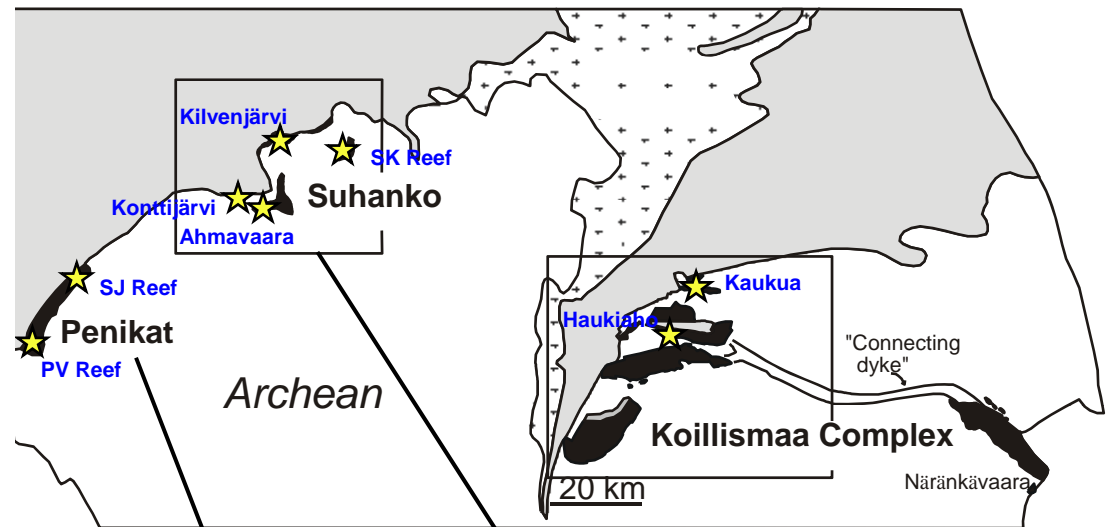


# Platinum Metal Deposits in Northern Finland

- 2.4 Ga old layered intrusions contain huge PGE potential
- Arctic Platinum Project by Gold Fields reported 17 mill. oz low-grade resources in reef and contact-type deposits
- Ore predominated by palladium (Pd/Pt = 4/1)

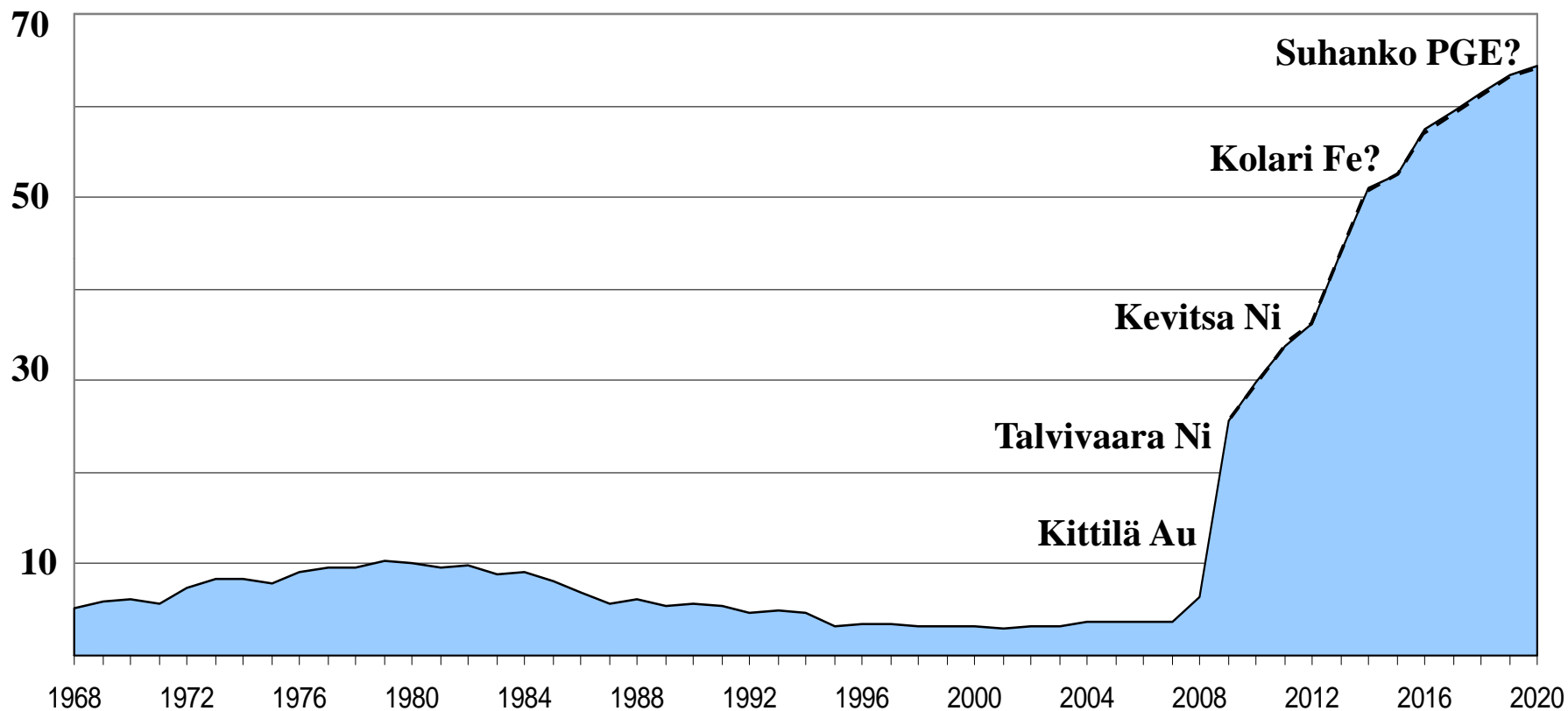


## PGE deposits and 2450 Ma mafic rocks



# Ore Extraction from Metal Mines 1968-2020\*

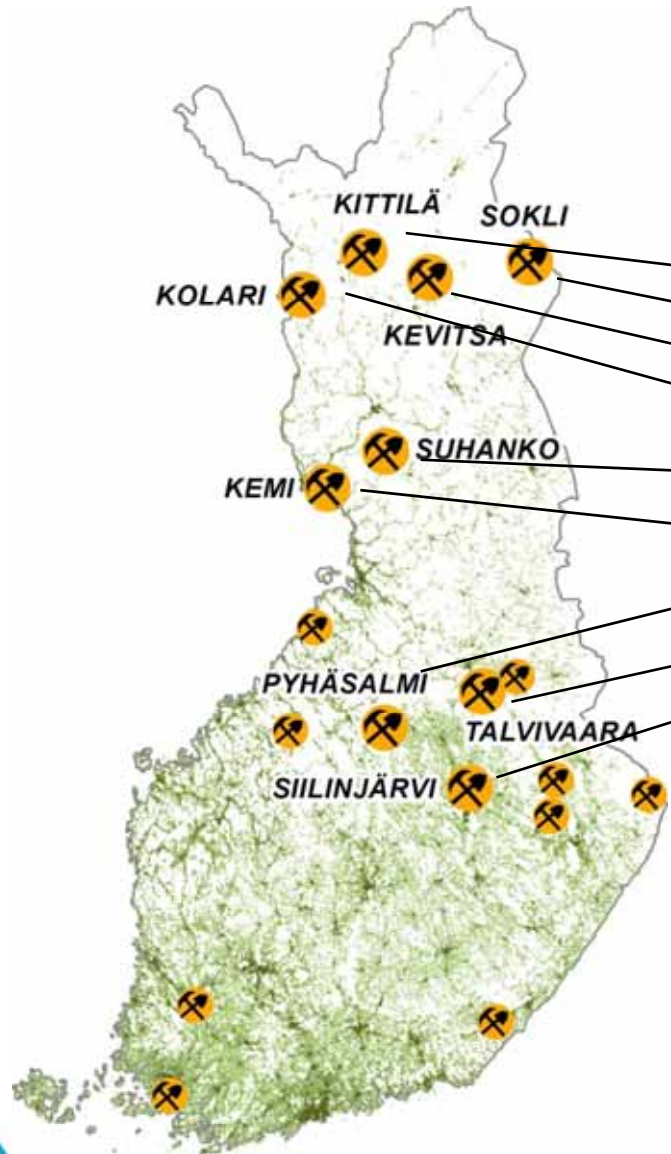
Mill. tons



\*Based on statistics by the Ministry of Employment and the Economy (1968-2008) and a GTK estimate for the future



# A Finnish Mining Vision 2020



**Main commodity**

**Estimated Revenues (Mill. €a) Employees**

Gold	200	500
Phosphorus	120	250
Nickel	150	250
Iron	200	200
Palladium	150	250
Chrome	200	300
Copper	120	220
Nickel	800	600
Phosphorus	120	250
Others	900	1200
<b>Total</b>	<b>2960</b>	<b>4020</b>

Base map: population density

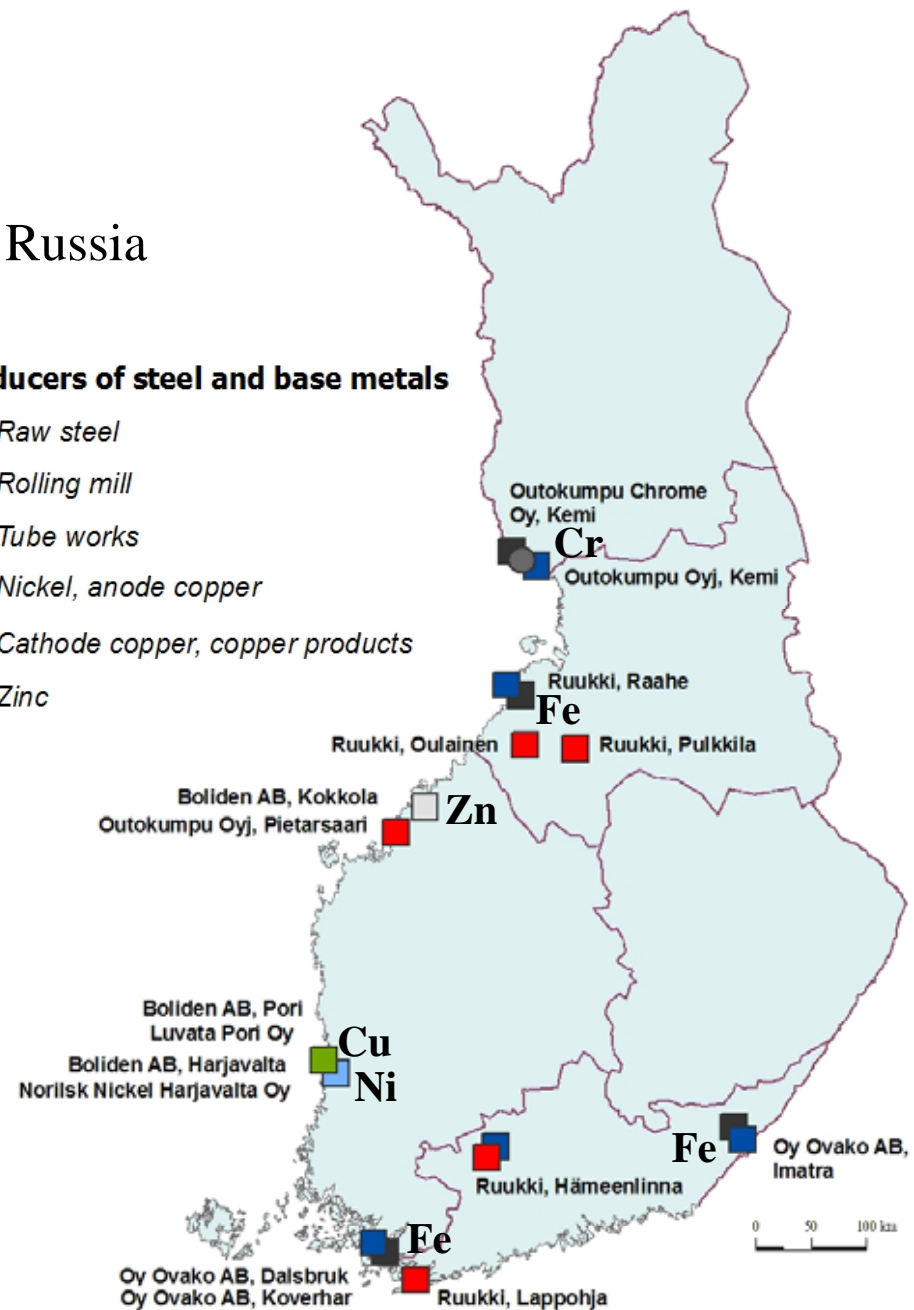
# Metal Plants

- Proximity to major markets in Eu and Russia
- Existing smelting and processing facilities for many commodities
- Downstream metal industry



## Producers of steel and base metals

- Raw steel
- Rolling mill
- Tube works
- Nickel, anode copper
- Cathode copper, copper products
- Zinc



# Explore Finland's Opportunities!

