

Apajalahti

Occurrence type: occurrence

Commodity	Rank	Total measure	Total production	Total resource	Importance
gold	1	0,52 t	NA	0,52 t	Occurrence
tungsten	3	51,6 t	NA	51,6 t	Occurrence
cobalt	3	25,8 t	NA	25,8 t	Occurrence
copper	3	64,5 t	NA	64,5 t	Occurrence

Easting EUREF: 579449,428

Northing EUREF: 7335401,503

Easting YKJ: 3579654

Northing YKJ: 7338470

Discovery year: 1958

Discovered by: Suomen Malmi Oy

Province: Kuusamo-Kuolajärvi (Co, Au)

District: Kuusamo (Co, Au)

Comments: Discovery Suomen Malmi, during 1958: Drilling into a geophysical anomaly. The first indication was an Au-rich erratic boulder found at the shore of Lake Kitkajärvi.

References: 2, 4, 5, 10

Mineral deposit type

Group: Metallogenetic deposit

Main type: Orogenic (metamorphic hydrothermal)

Sub type 1: Au-Co-Cu

Comments: The auriferous fluids were transported along deep, rift-tectonic faults up to the greenschist-metamorphic environment, concentrated on the antiform; the metals precipitated in structurally controlled sites close to impermeable dolerites and metavolcanic units or, rather, in the more competent sericite quartzite units between the more plastic mafic units. Minimum temperature for Au mineralisation is 270-310°C.

References: 6, 7, 8, 9, 11, 13, 14

Dimension

Expression: exposed

Area (ha): NA

Form: discordant

Dip azim: NA

Shape: irregular

Dip: 70

Length (m): 300

Plunge azim: NA

Width (m): 25

Plunge dip: NA

Thickness (m): 25

Orientation method: NA

Depth (m): NA

Dimension comments: The deposit is open at depth and, possibly, along strike at both ends. Width and thickness vary from 5 to 50 m. The ore body has a steep dip to the SE.

Holder history

Previous holders:

Company	Years	Holding type	Comments
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Finkallio Oy	2018	Application for exploration permit	NA
Belvedere Resources Ltd	2002	NA	NA
Outokumpu Oy	1989-1993	NA	NA
Geological Survey of Finland	1980	NA	NA
Outokumpu Oy	1970-1980	NA	NA
Suomen Malmi Oy	1967-1969	NA	NA
Suomen Malmi Oy	1957-1962	NA	NA

EXPLORATION ACTIVITY

Outokumpu Oy

Years	Activity type	Geologist	Exploration result	Ref
1994-1994	core drilling	Jarmo Lahtinen	NA	
<i>Two diamond-drill holes, total 89 m.</i>				
1994-1994	detailed geology	Jarmo Lahtinen	NA	10, 12, 13, 14

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
1989-1989	regional geochemistry	NA	NA	1, 6, 7, 8, 9
<i>Regional till geochemical survey</i>				
1982-1982	detailed geophysics	NA	NA	1, 6, 7, 8, 9

Outokumpu Oy

Years	Activity type	Geologist	Exploration result	Ref
1980-1980	detailed geochemistry	Jarmo Lahtinen	NA	10, 12, 13, 14
<i>till/weathered bedrock</i>				
1980-1981	core drilling	Jarmo Lahtinen	negative feasibility study	10, 12, 13, 14
<i>4 drill holes (?)</i>				
Intersections				
	HoleID	AL-14		
	From-To	NA		
	Length	0,9m		
	gold	79ppm		
	HoleID	AL-18		
	From-To	NA		
	Length	0,2m		
	gold	117ppm		
	HoleID	AL-2		
	From-To	NA		
	Length	0,2m		
	gold	239ppm		

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref

1980-1980	regional geophysics	NA	NA	
<i>Low-altitude airborne magnetic, electromagnetic and radiometric survey</i>				

Outokumpu Oy

Years	Activity type	Geologist	Exploration result	Ref
1980-1980	detailed geophysics	Jarmo Lahtinen	NA	

Suomen Malmi Oy

Years	Activity type	Geologist	Exploration result	Ref
1967-1969	detailed geology	V.L. Hämäläinen, K. Airas	key geological features	9, 10, 12, 13, 14
1967-1969	core drilling	K. Airas	NA	9, 10, 12, 13, 14
1967-1969	detailed geochemistry	K. Airas	NA	9, 10, 12, 13, 14
1967-1969	detailed geophysics	K. Airas	NA	9, 10, 12, 13, 14
1960-1961	core drilling	V.L. Hämäläinen, K. Airas	mineral resource defined	4, 10, 12
	<i>Several diamond-drill holes (at least 27 drill holes)</i>			
1957-1962	detailed geology	V.L. Hämäläinen, K. Airas	mineral occurrences	
1957-1962	detailed geochemistry	V.L. Hämäläinen, K. Airas	geochemical anomaly	
1957-1962	detailed geophysics	V.L. Hämäläinen, K. Airas	geophysical anomaly	

RESOURCES AND RESERVES

Most recent

Type:	Company:	Year:	Date:	Calc Method:	Reference:
Resource	Outokumpu Oy	1980	NA	Non-compliant resource estimate	4
<i>Comments: Significant core loss in resource drilling. The deposit is open to the ENE, at depth, and possibly to the west. In addition, 2 m @ 6.7 ppm Au just 300 m to the NE of the resource.</i>					
Category:		Inferred mineral resource			
Tonnage:		0,129 Mt			
cobalt		0,02 %			
copper		0,05 %			
tungsten		0,04 %			
gold		4 ppm			
Cutoff:		gold 1 ppm			

Previous calculations

Type:	Company:	Year:	Date:	Calc Method:	Reference:
Resource	Suomen Malmi Oy	1960	NA	Non-compliant resource estimate	4, 10, 12
<i>Comments: Significant core loss in resource drilling</i>					
Category:		Inferred mineral resource			
Tonnage:		0,099 Mt			
gold		5 ppm			
Cutoff:		NA			

GEOLOGY

Host rock: Garnet-Anthophyllite Gneiss, Sericite quartzite

Garnet-Anthophyllite Gneiss (Host rock)

Rock type: Host rock

Proportion: major

Grain size: NA

Color: NA

References: 3, 4, 6, 7, 8, 9, 10, 11, 13

Comments: the garnet-rich rocks are the principal host rock for gold

Ore minerals:

Mineral	Proportion	Mineral texture
Chalcopyrite	minor	
Pyrite	minor	
Pyrrhotite	minor	
Scheelite	minor	

Other minerals:

Mineral	Proportion	Mineral texture
Anthophyllite	present	Alteration product
Garnet	present	Alteration product

Alteration:	Distribution:	Degree:	Relation to mineralization:
garnet skarnification	Disseminated	Strong	Syn
<i>Comments: Garnet-antophyllite rock (gneiss-like) in the core of the ore body. It is NOT a skarn sensu stricto.</i>			

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	Min T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		

Comments: Upper-greenschist facies. Mineral assemblages, especially garnet-antophyllite, suggest that the peak-metamorphic grade is, at least, transitional between upper-greenschist and lower-amphibolite facies

Geological age:

Geological era:	Max age - Min age (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500	N	

Sericite quartzite (Host rock)

Rock type: Host rock

Proportion: major

Grain size: NA

Color: NA

References: 3, 6, 7, 8, 9, 10, 11, 13

Comments: Sequence of alteration (Vanhainen 2001): Partial diagenetic albitisation of feldspars and sericitisation of clay minerals. 2. Locally intense albitisation of clastic sediments and spilitisation of volcanic units when the 2.206 Ga mafic sills and dykes heated the evaporite-bearing sequence and put hot brines into circulation. 3a. Carbonation. 3b. Formation of magnetite. 3c. The main Fe-K-Na-S metasomatism and Au mineralisation.

Ore minerals:

Mineral	Proportion	Mineral texture
Chalcopyrite	minor	
Gold	minor	
		<i>Native gold associated with oxides and silicates.</i>
Ilmenite	minor	
Magnetite	minor	
Pyrite	major	
Pyrrhotite	major	
Rutile	minor	

Other minerals:

Mineral	Proportion	Mineral texture
Actinolite	present	Alteration product
Albite	present	
Anthophyllite	present	
Biotite	present	
Calcite	present	Alteration product
Chlorite	present	Alteration product
Chloritoid	present	Alteration product
Cordierite	present	
Garnet	present	
K-Feldspar	present	Alteration product
Muscovite	present	Alteration product
Quartz	present	
Scheelite	present	
Sericite	present	Alteration product
Tourmaline	present	Alteration product
Tremolite	present	Alteration product

Alteration:	Distribution:	Degree:	Relation to mineralization:
albitic alteration	NA	Strong	Pre
<i>Comments: Locally intense Albitisation of clastic sediments and spilitisation of volcanic units when the 2.206 Ga mafic sills and dykes heated the evaporite-bearing sequence and put hot brines into circulation.</i>			
carbonate alteration	NA	NA	Syn
calcsilicate alteration	Disseminated	Moderate	Syn
sulphidation	Veins	NA	Syn
silicification	NA	NA	Syn
biotite alteration	NA	NA	Syn
sericitic alteration	NA	Moderate	Syn
chloritic alteration	NA	NA	Syn

Metamorphic description:

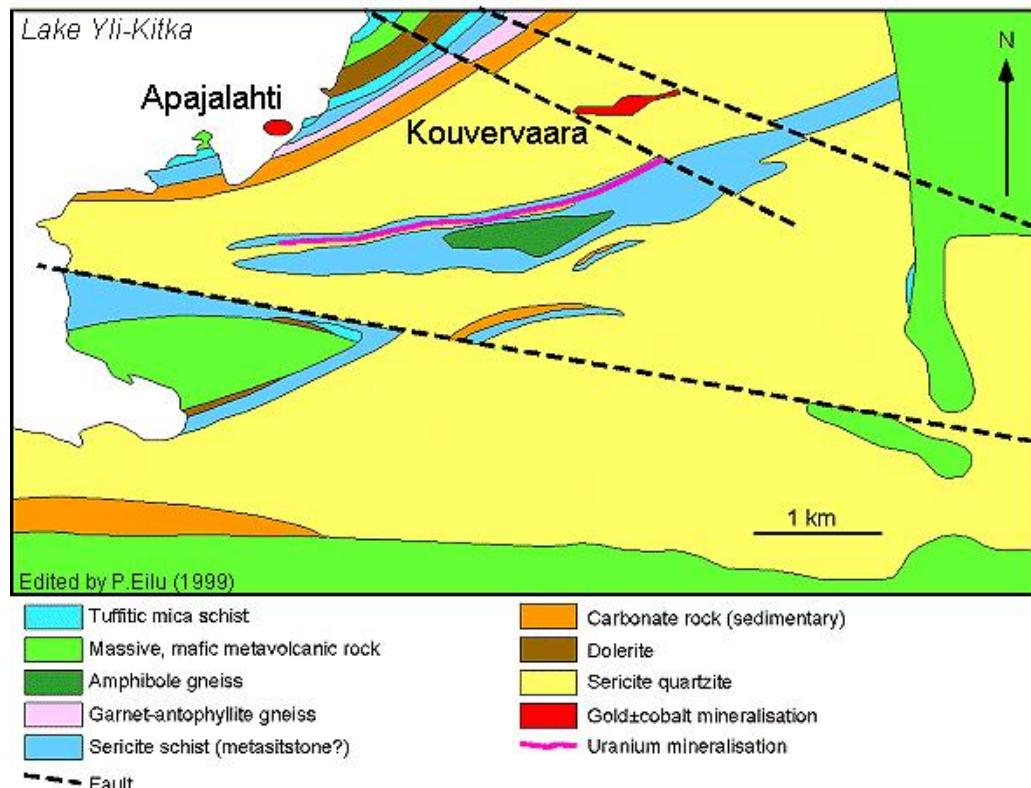
Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	Min T- Max T (°C)
Regional	epidote amphibolite metamorphic facies	low metamorphic grade	NA		
<i>Comments: Garnet and anthophyllite suggest conditions transitional between greenschist and amphibolite facies</i>					

Geological age:

Geological era:	Max age - Min age (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1800-2070		Y
<i>Comments: Mineralisation between 2.07-1.8 Ga.</i>			
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

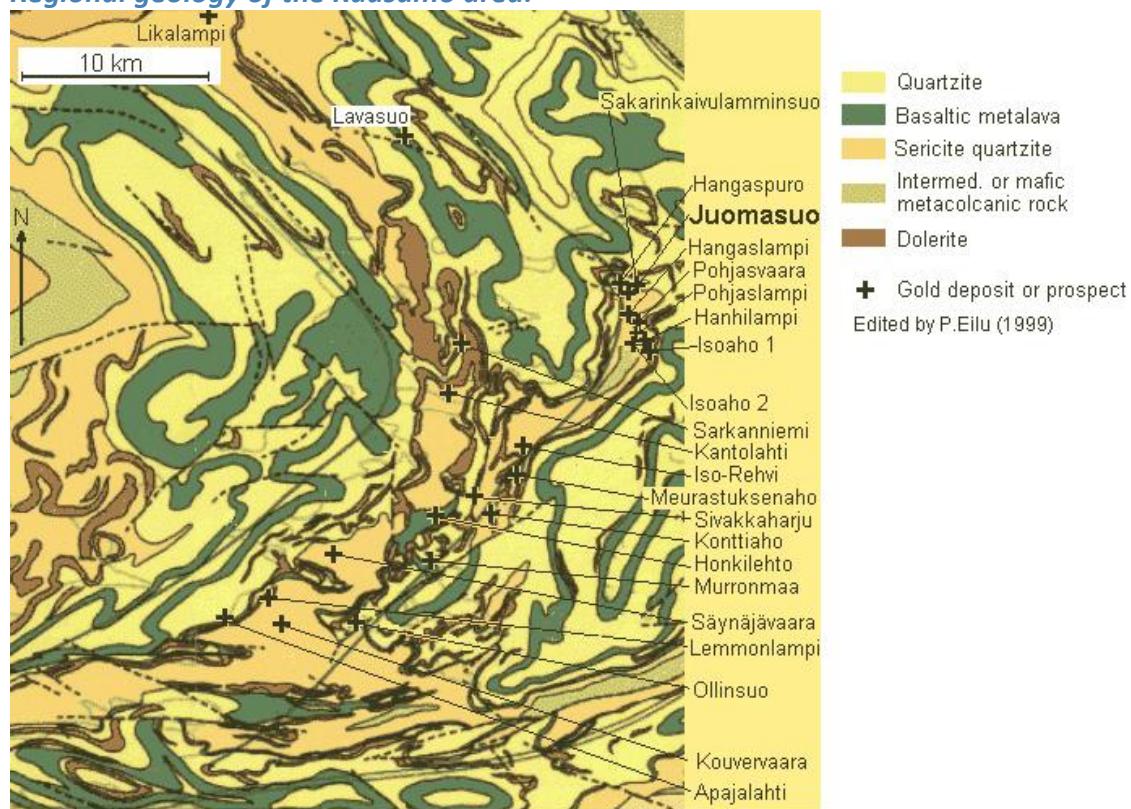
Figures

Local geology of Apajalahti:



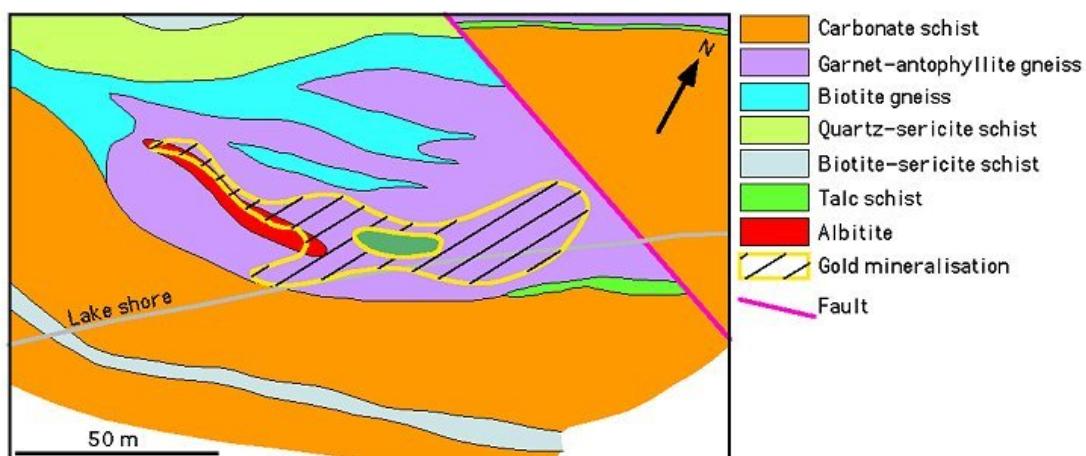
Geology of the Kouvervaara–Apajalahti area, after Kuronen (1981) and Vuokko (1988).

Regional geology of the Kuusamo area:



Deposits and prospects in the Kuusamo Schist Belt. Geology from Silvennoinen (1992). Solid and dashed, curved lines indicate boundaries between lithological units, faults and shear zones

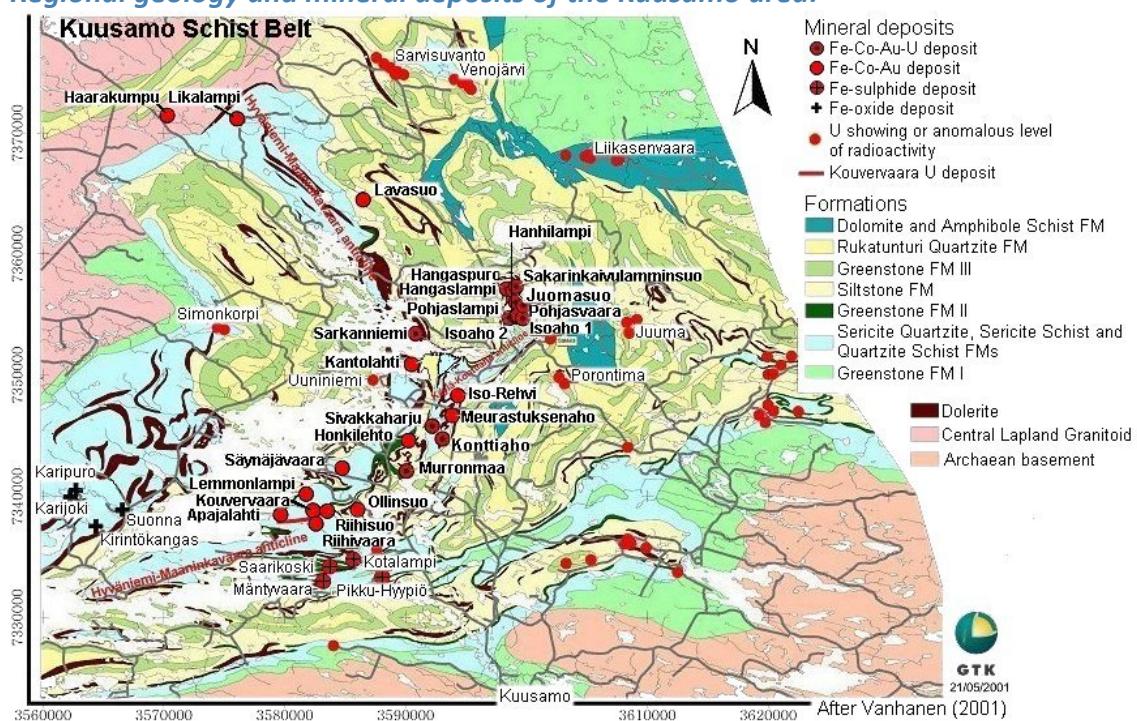
Geology of the Apajalahti deposit:



Apajalahti, Kuusamo schist belt. After Kuronen (1981).

Edited by P.Eilu (1999)

Regional geology and mineral deposits of the Kuusamo area:



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