Soretialehto

Occurence type: occurrence

Commodity	Rank	Total measure	Total production	Total resource	Importance
gold	1	0,05 t	NA	0,05 t	Occurrence

Easting EUREF: 422728,731
Northing EUREF: 7515824,523
Easting YKJ: 3422870
Northing YKJ: 7518965

Discovery year: 1989
Discovered by: Geological Survey of Finland
Province: Kittilä (Au, Cu)
District: Sirkka (Cu, Au, Ni, Co)
Comments: Discovery: the first indication was a till geochemical anomaly and trenching in that area led to the discovery of the deposit

References: 1, 11, 12, 14, 16

Mineral deposit type

Group: Metallogenic deposit
Main type: Orogenic (metamorphic hydrothermal)
Comments: The shear zone at the contact between ultramafic rocks and graphitic phyllite formed the local channel for fluid flow. Carbonated komatiite was brecciated as it was the more competent unit at site and, hence, was more intensely veined and forms the main host to ore.
References: 4, 6, 7, 17

Dimension

Expression: exposed
Form: discordant
Shape: NA
Length (m): NA
Width (m): NA
Thickness (m): NA
Depth (m): NA
Area (ha): NA
Dip azim: 135
Dip: NA
Plunge azim: NA
Plunge dip: NA
Orientation method: NA

Holder history

Current holder: Rupert Exploration Finland Oy
Years: 2018-2021
Holding type: Exploration permit

Previous holders:

Company	Years	Holding type	Comments
Aurion Resources Oy	2015	Exploration permit	Appl. for exploration permit
Lappland Goldminers Oy	2012	Exploration permit	Appl. for exploration permit

Scan Mining Oy	2005-2009	Claim (old law)	NA
Lappland Goldminers Oy	2005-2012	Claim (old law)	NA
Geological Survey of Finland	2003-2007	Claim (old law)	marble
Terra Mining Oy	1997-2001	Claim (old law)	NA
Saxo Oy	1996-2000	Claim (old law)	marble
Geological Survey of Finland	1987-1995	Claim (old law)	NA

EXPLORATION ACTIVITY

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
1996-1996	regional geophysics	NA	key geological features	3, 6, 7, 10, 17
	Low-altitude airborne magnetic, electromagnetic and radiometric survey			

1990-2003	core drilling	Veikko Keinänen.	NA	7, 8, 9, 18
	Core drilling (reconnaissance drilling): 27 diamond-drill holes, total 1184.7 m.			
	Intersections			
	HoleID	NA		
	From-To	NA		
	Length	8m		
	gold	4ppm		
	HoleID	NA		
	From-To	NA		
	Length	1m		
	gold	7,5ppm		
	HoleID	NA		
	From-To	NA		
	Length	3,1m		
	gold	3,6ppm		
	HoleID	NA		
	From-To	NA		
	Length	5m		
	gold	1,88ppm		

1989-2003	excavation	Veikko Keinänen.	NA	3, 6, 7, 10, 17

1985-1990	detailed geophysics	Veikko Keinänen.	NA	3, 6, 7, 10, 17

1985-1990	percussion drilling	Veikko Keinänen.	NA	3, 6, 7, 10, 17

1979-1991	regional geochemistry	Veikko Keinänen.	NA	3, 10
	Regional geochemical till survey; As, Co, Cu and Mo anomalies in till cover the area.			

1977-1990	detailed geology	Veikko Keinänen.	NA	3, 6, 7, 10, 17

Atri Oy

Years	Activity type	Geologist	Exploration result	Ref
1940-1940	detailed geophysics	NA	NA	7, 10

1940-1940	core drilling	NA	NA	7, 10

Figures

The main exploration trench:

Main exploration trench (10-25 m wide) across outcropping mineralisation at Soretialehto. Two rock types visible: brown metakomatiite (on left and center) and black graphitic phyllite (on right). Photo Pasi Eilu 19/8/1998.

The main exploration trench:

Main exploration trench (10 m wide) across outcropping mineralisation at Soretialehto. Photo Pasi Eilu, 19/8/1998.

RESOURCES AND RESERVES

Most recent

Type:	Company:	Year:	Date:	Calc Method:	Reference:
Resource	Geological Survey of Finland	2001	NA	Non-compliant resource estimate	
	Category:	**Inferred mineral resource**			
	Tonnage:	**0,013 Mt**			
	gold	3,5 ppm			
	Cutoff:	**NA**			

GEOLOGY

Host rock: Komatiite, Felsic volcanic rock, Graphite Phyllite

Komatiite (Host rock)

Rock type: Host rock
Proportion: major
Grain size: NA
Color: NA
References: 2, 3, 4, 5, 6, 7, 8, 10, 13, 15, 17
Comments: The mineralisation is at the contact zone between altered komatiite and graphitic phyllite. Auriferous quartz-dolomite-albite-pyrite vein-network zones. Auriferous quartz-dolomite-albite-pyrite vein-network zones which have a NE-SW trend

Metamorphic description:
Ore minerals:

Mineral	Proportion	Mineral texture
Arsenopyrite	minor	
Chalcopyrite	minor	
Galena	minor	
Gersdorffite	minor	
Gold	present	
	Native gold as inclusions and fractures in pyrite and as free grains associated with vein quartz. Fineness; 91.6% Au, 6.9% Ag, 1.9% Se	
Millerite	minor	
Pyrite	major	
Ullmannite	minor	
Vaesite	minor	

Other minerals:

Mineral	Proportion	Mineral texture
Albite	present	Alteration product
Calcite	present	Alteration product
Chlorite	present	Alteration product
Dolomite	present	
Fuchsite	present	Alteration product
Magnetite	present	Alteration product
Quartz	present	
Scheelite	present	
Sericite	present	Alteration product
Talc	present	Alteration product

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: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic; Talc-chlorite-calcite.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1852-1890		Y
Comments: The gold mineralisation probably took place between 1852-1890 Ma; Mineralisation post-dates the formation of penetrative fabric at site.			
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

Felsic volcanic rock (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 6, 7, 8, 15

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: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic.					

Geological age:

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

Graphite Phyllite (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 6, 7, 8, 15, 19
Comments: The mineralisation is at the contact zone between komatiite and graphitic phyllite. Auriferous quartz-dolomite-albite-pyrite vein-network zones which have a NE-SW trend

Metamorphic description:
Ore minerals:

Mineral	Proportion	Mineral texture
Graphite	present	

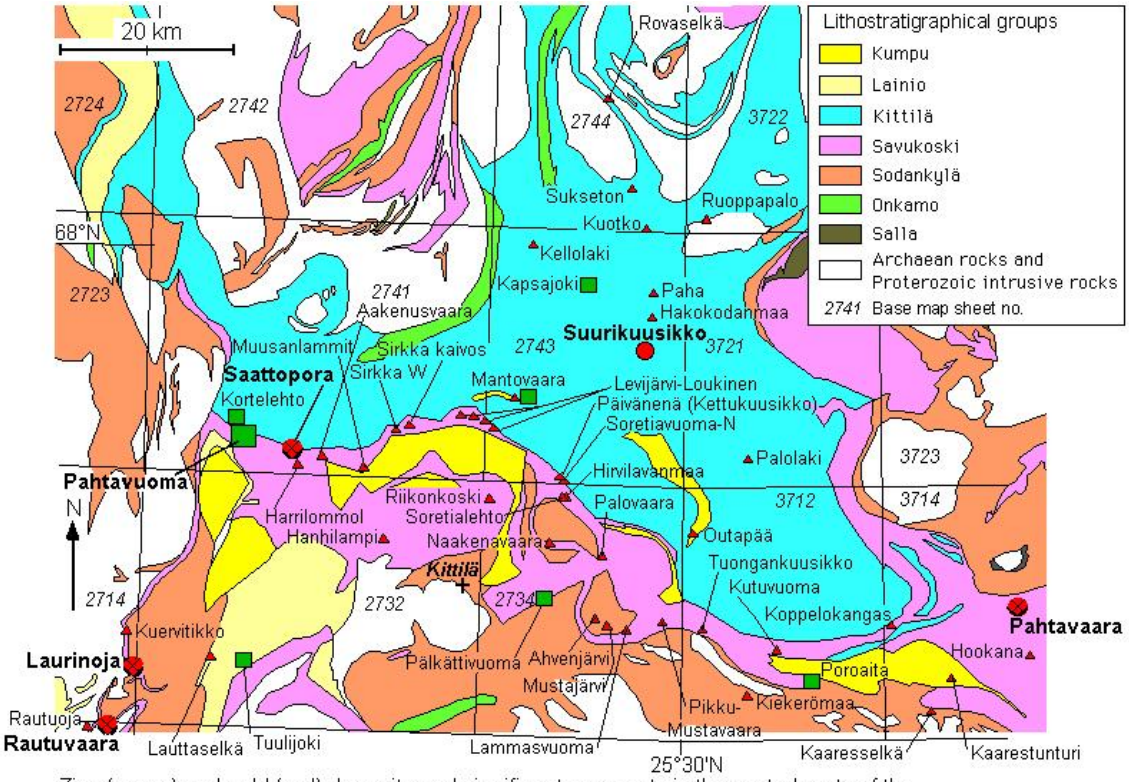
Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		
Comments: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic.					

Geological age:

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

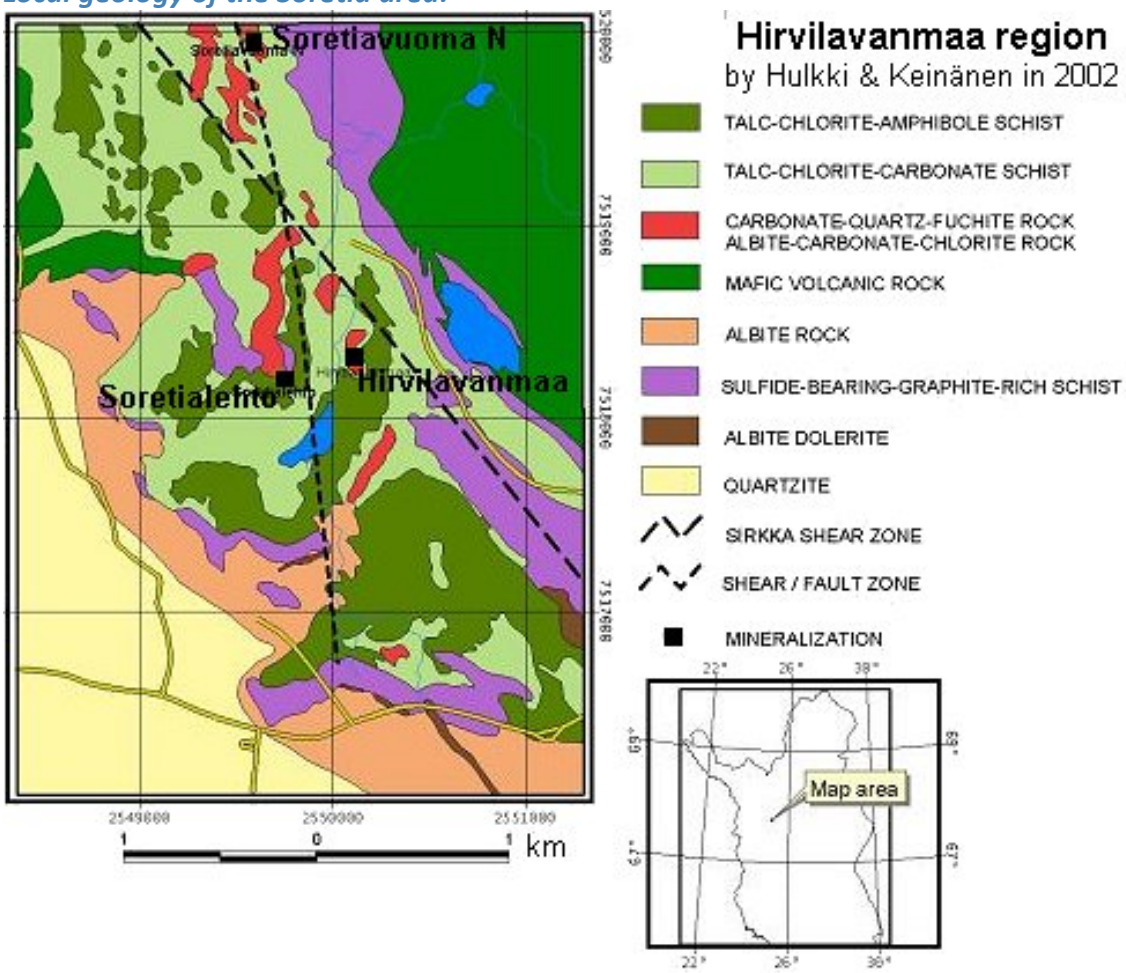
Figures

Regional geology:

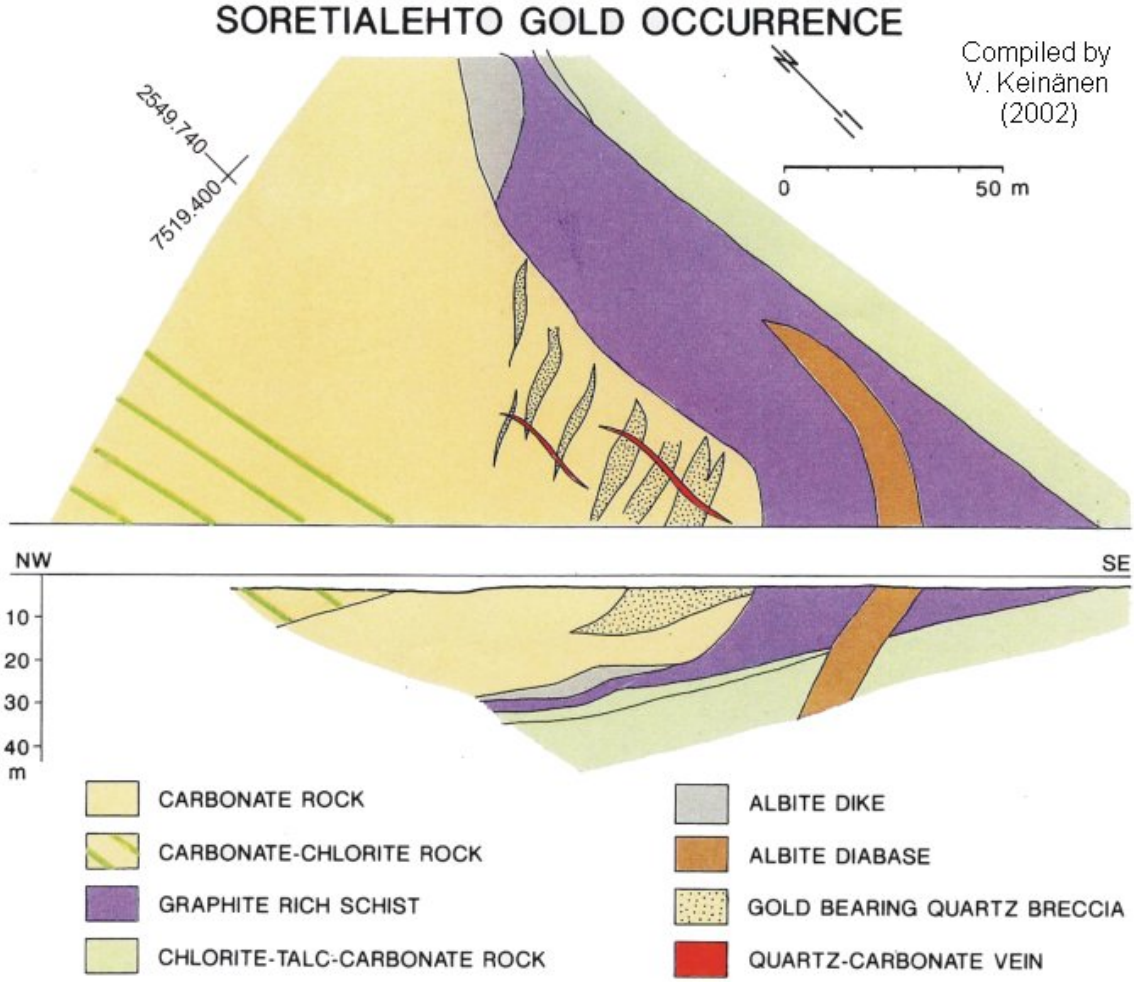


Zinc (green) and gold (red) deposits and significant prospects in the central parts of the Central Lapland greenstone belt. Lithostratigraphy from Lehtonen et al. (1998). Edited by P. Eilu (2007)

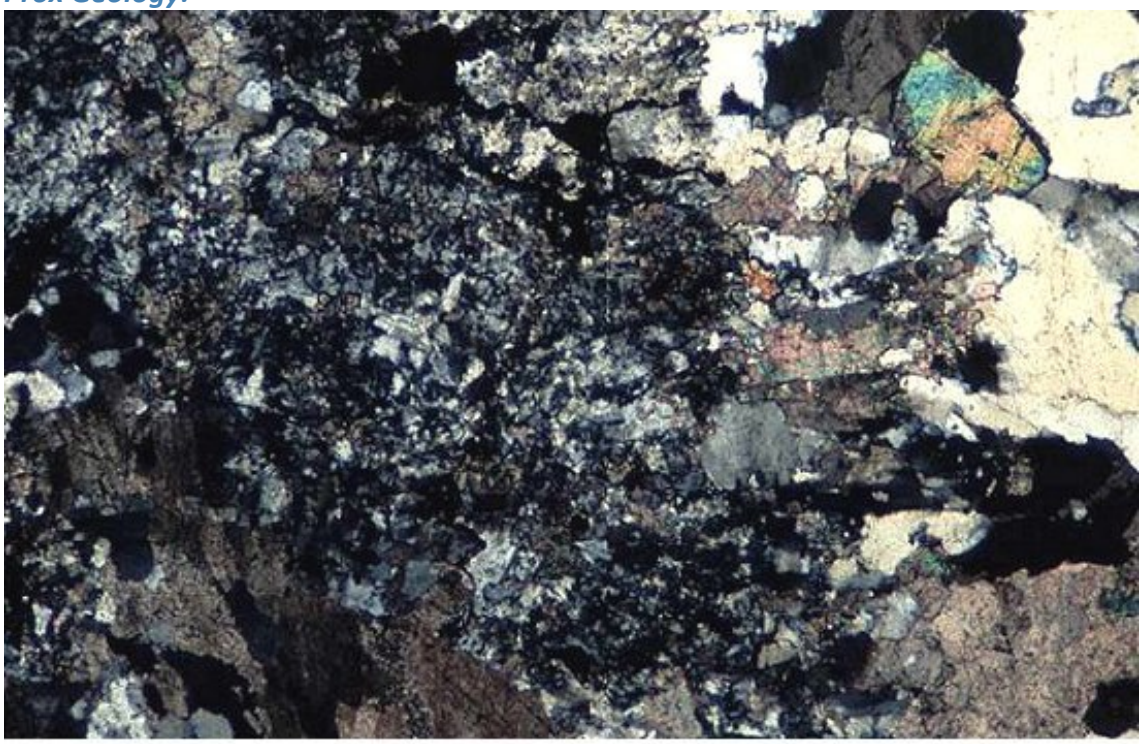
Local geology of the Soretia area:



Geology of the Soretialehto target:

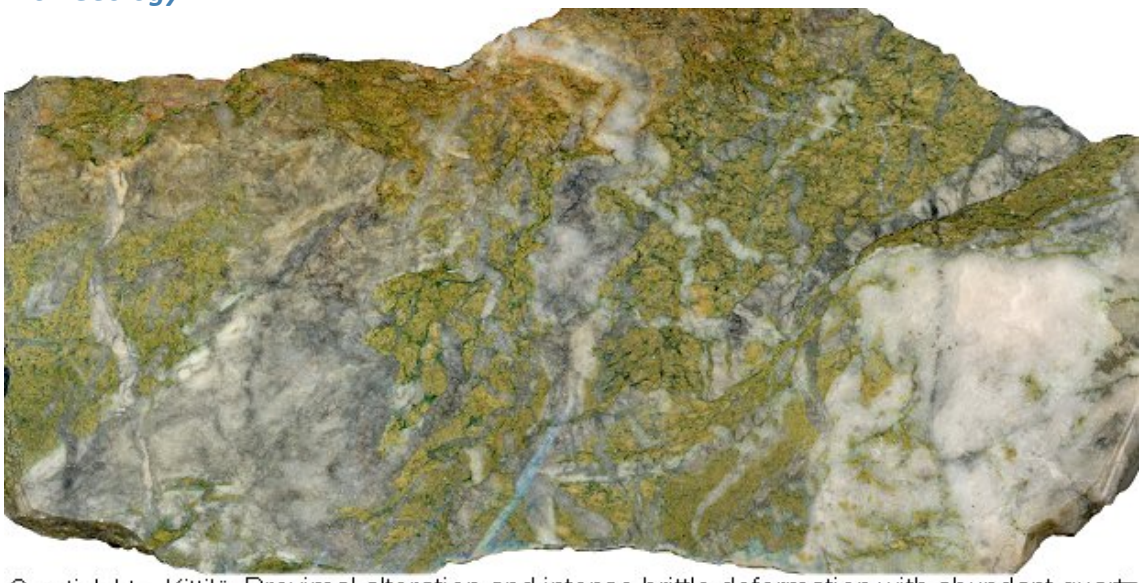


Prox Geology:



Proximal alteration in metakomatiite: mineral assemblage quartz-albite-sericite-ankerite-pyrite, Soretialehto. Field of view 3.2 mm. Photo Pasi Eilu, 1998.

Prox Geology:



Soretialehto, Kittilä. Proximal alteration and intense brittle deformation with abundant quartz -carbonate veins in metakomatiite. Mineral assemblage quartz - fuchsite - Fe dolomite - magnesite - pyrite. Veins: quartz-albite-Fe dolomite with minor pyrite. Field of view 13 cm. Photo Jari Väätäinen.

REFERENCES

1. Eilu, P., Pankka, H., Keinänen, V., Kortelainen, V., Niiranen, T. & Pulkkinen, E. 2007. Characteristics of gold mineralization in the greenstone belts of northern Finland. Geological Survey of Finland, Special Paper 44, 57-106.*http://tupa.gtk.fi/julkaisu/specialpaper/sp_044_pages_057_106.pdf*

2. Hölttä, P., Väisänen, M., Väänänen, J. & Manninen, T. 2007. Paleoproterozoic metamorphism and deformation in Central Lapland, Finland. Geological Survey of Finland, Special Paper 44, 7-56. *http://tupa.gtk.fi/julkaisu/specialpaper/sp_044_pages_007_056.pdf*

3. Johansson, P., Keinänen, V. & Lehmuspelto, P. 1986. Geochemical exploration of tungsten in glaciogenic deposits in Soretiapulju, western Finnish Lapland. Proceedings in Areas of Glaciated Terrain. Symposium held in Kuopio, 1 and 2 September 1986. London: The Institution of Mining and Metallurgy, 61-67.

4. Keinänen, V. & Holma, M.J. 2001. Levijärvi and Soretialehto - two epigenetic lode-gold deposits controlled by the Sirkka thrust zone within the Paleoproterozoic Central Lapland Greenstone Belt, Kittilä, northern Finland. In: P.J. Williams (ed) 2001: A Hydrothermal Odyssey. May 17-19th, 2001,Townsville. Extended abstracts. EGRU and JCU. 102-103.

5. Keinänen, V. & Hulkki, H. 1992. Main features of the three geochemically different gold mineralizations in Soretiavuoma, Finnish Lapland. 20:e Nordiska Geologiska Vintermötet, Reykjavik. Abstracts. p. 96.

6. Keinänen, V. 1994. Shear zone-related Soretialehto gold occurrence in green carbonate rocks in the Central Lapland Greenstone Belt, Kittilä, Finnish Lapland. 21:a Nordiska Geologiska vintermötet, Luleå. Abstracts. p. 99.

7. Keinänen, V. 1997, 1998, 2003. Personal communications on 24/11/1997 and 18/8/1998.

8. Keinänen, V. 2007. Personal communication 11 Oct. 2007.

9. Keinänen, V., 1992. Tutkimustyöselostus Kittilän kunnassa, valtausalueella Soretiajärvi 2, Kaiv.Rn: 4154/1, suoritetuista
malmitutkimuksista. Geologian tutkimuskeskus, arkistoraportti M06/2734/92/2/10 (in Finnish) *http://tupa.gtk.fi/raportti/valtaus/m06_2734_92_2_10.pdf*

10. Keinänen, V., Johansson, P. & Lehmuspelto, P. 1988. Soretiavuoman volframi- ja kultatutkimuksista. Annales Universitatis Turkuensis, Sarja C, Tom. 67, 69-77. (in Finnish)

11. Korkalo, T. 2006. Gold and copper deposits in Central Lapland, northern Finland, with special reference to their exploration and exploitation. Acta Univ. Oulensis, A Scientiae Rerum Naturalium 461. 122 p.*http://herkules.oulu.fi/isbn951428108X/isbn951428108X.pdf*

12. Lehtonen, M., Airo, M.-L., Eilu, P., Hanski, E., Kortelainen, V., Lanne, E., Manninen, T., Rastas, P., Räsänen, J. & Virransalo, P. 1998. Kittilän vihreäkivialueen geologia: Lapin vulkaniittiprojektin raportti. Summary: The stratigraphy, petrology and geochemistry of the Kittilä greenstone area, northern Finland: a report of the Lapland Volcanite Project. Geological Survey of Finland, Report of Investigation 140. 144 p.*http://tupa.gtk.fi/julkaisu/tutkimusraportti/tr_140.pdf*

13. Mänttäri, I. 1995. Lead isotope characteristics of epigenetic gold mineralization in the Palaeoproterozoic Lapland greenstone belt, northern Finland. Geological Survey of Finland, Bulletin

381. 70 p.*http://tupa.gtk.fi/julkaisu/bulletin/bt_381.pdf*

14. Patison, N.L. & Oliver, N.H.S. 2001. Structural features associated with Palaeoproterozoic gold deposits in the Central Lapland Greenstone Belt, northern Finland. In: P.J. Williams (ed) 2001: A Hydrothermal Odyssey. May 17-19th, 2001, Townsville. Extended abstracts. EGRU and JCU. 162-163.

15. Patison, N.L. 2007. Structural controls on gold mineralisation in the Central Lapland Greenstone Belt. Geological Survey of Finland, Special Paper 44, 107-124.
http://tupa.gtk.fi/julkaisu/specialpaper/sp_044_pages_107_124.pdf

16. Pekkala, Y. and Puustinen, K. 1978. The chromian marbles of Kittilä, Finnish Lapland. Geological Society of Finland, Bulletin 50, 15-29.
http://tupa.gtk.fi/julkaisu/sgs_bulletin/sgs_bt_050_pages_015_029.pdf

17. Riikonen, S. 1997. Kittilän kromimarmorien mineralogia. Unpublished MSc thesis, Department of Geology, University of Oulu. 61 p. (in Finnish)

18. Vartiainen, R. ja Keinänen, V. 2007. Tutkimustyöselostus Kittilän kunnassa, Soretia -nimisellä valtauksella nro 7540/1 suoritetuista rakennuskivi- ja kultatutkimuksista. Geologian tutkimuskeskus, raportti M06/2734/2007/10/61, (in Finnish, English summary)
http://tupa.gtk.fi/raportti/valtaus/m06_2734_2007_10_61.pdf

19. Väisänen, M. 2002. Structural features in the Central Lapland greenstone belt, northern Finland. Geological Survey of Finland, Report K 21.42/2002/3. 20 p.
http://tupa.gtk.fi/raportti/arkisto/k21_42_2002_3.pdf