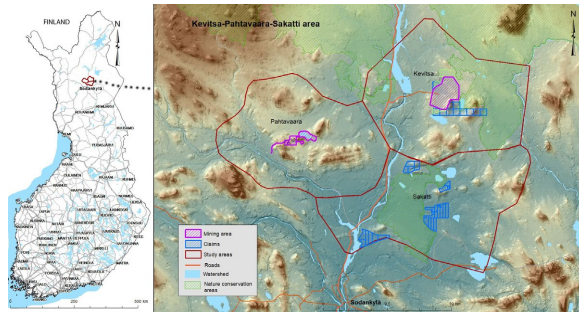


Baselines for potentially harmful elements in mining activity areas in Central Lapland, Finland

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Element concentrations in topsoils are derived not only from regional geology and postglacial processes but also by air-borne pollutants and drainage in forested and cultivated areas. Concentrations uninfluenced by human activities i.e. geochemical baselines are of essential importance in environmental legislation which prescribes limits for potentially harmful elements in contaminated land. In Finland The Government Decree on the Assessment of Soil Contamination and Remediation Needs (214/2007) refers to baseline concentrations that can be considered in the assessment process instead of the threshold values given the Decree.

The baseline values for soils have been studied from mining environments in Finland since 2016 and collected into national geochemical baseline database. Database includes e.g. baseline concentrations of As, Co, Cr, Ni, V and Au, Pt and Pd. The mining activity in Central Finnish Lapland study areas are Kevitsa Ni-Cu mine, Pahtavaara Au mine and the Sakatti area, potential Ni-Cu mine.

Table 1. presents upper recommended limit of baseline variation (SSTP values) from all samples of the case area. The comparison with threshold values given in the Decree shows that the baselines for As, Co, Cr, Ni and V in soils of Central Finnish Lapland exceed the threshold values. In the case of other potential harmful metals the threshold values are valid when assessing soil contamination and remediation needs. Anomal great concentrations of As are typical for soils in the Pahtavaara mining area whereas in the Kevitsa and Sakatti areas, As concentrations are in majority of samples less than threshold values [1]. Instead, abnormal great concentrations of Co, Cr and Ni (exceeding the thresholds) are characteristics for the soils in the Kevitsa and Sakatti areas [1].

[1] Hatakka, T. et al (2017). Kaivosalueiden maaperän taustapitoisuus – pilottitutkimus v. 2016. Geological Survey of Finland report 12/2017 Available in Finnish: https://tupa.gtk.fi/raportti/arkisto/12_2017.pdf and unpublished results 2017.

Figure 1. Map of mining activity areas in Central Finnish Lapland

Table 1. Medians, maximums and upper recommended limits of baseline variation (SSTP values) for the soils in Central Finnish Lapland. The comparison values are threshold, guideline values given in the Decree 214/2007 (Appendix 1).

Central Lapland Topsoil & subsoil; tills and sands	All samples (n = 176)			Threshold	Lower guideline value mg/kg	Upper guideline value mg/kg
	Median	Maximum	SSTP			
As	1.63	10.2	7	5	10	50
Co	8.23	44.9	22	20	100	250
Cr	83.9	744	185	100	200	300
Ni	31.8	428	78	50	100	150
V	49	114	106	100	150	250