



RESEARCH REPORT No. RAM0871/90

- Requested by:** Suomen Vuolukivi Oy, 83940 NUNNANLAHTI.
- Order:** Written order dated 26.3.1990 by Jari Reijonen.
- Samples:** Three stone slabs measuring about 15x250x250 mm³ delivered by the customer. The slabs were marked with Roman numerals I, II and III. According to the customer the samples were soapstone from Nunnanlahti and differed in composition as follows:
- I low (i.e. normal) content of sulphide minerals
 - II higher than usual content of sulphide minerals
 - III high content of sulphide minerals
- Task:** To determine whether the stone slabs fulfil the requirements set in Decision 365/85 of the Ministry of Trade and Industry. The Decision specifies allowable amounts of soluble heavy metals in articles that are used with, or may come into contact with, foodstuffs. In addition to the elements mentioned in the Decision determination of soluble copper in the slabs was also requested. In addition, based on the composition of the slabs it was requested that other potential health hazards be evaluated with respect to the preparation and/or preservation of food.
- Experimental:** Two small stone plates measuring about 15x100x100 mm³ were sawn from each of the sample slabs for the solubility test. The test was performed according to standard ISO 6486/1 mentioned in the Decision of the Ministry of Trade and Industry. The plates were placed in a 4 wt.-% water solution of acetic acid with their smoother surfaces 5 mm below the solution surface. The immersion time was 24 h at ambient temperature.
- The general composition of the stone slabs was examined by X-ray diffractometry and optical microscopy.

Results:

The amounts of soluble metals in the stone samples determined by the solubility test are shown in Table 1. The examined metals were lead (Pb), cadmium (Cd), chromium (Cr), nickel (Ni) and copper (Cu).

Table 1. The amounts of soluble metals in the stone samples.

Sample	Solubility mg/dm ²				
	Pb	Cd	Cr	Ni	Cu
I	<0.006	<0.002	<0.006	0.003	<0.01
II	0.007	<0.002	<0.006	0.005	<0.01
III	0.013	<0.002	0.006	0.007	<0.01

According to the X-ray diffraction diagrams the composition of all three samples was typical of Nunnanlahti soapstone. The main components were talc $Mg_3Si_4O_{10}(OH)_2$ and magnesite $MgCO_3$, along with some chlorite and dolomite plus varying amounts of opaque minerals of which the most important were magnetite Fe_3O_4 , and sulphide minerals. Optical examination showed the main part of the sulphides to comprise pyrrhotite $Fe_{1-x}S$, the rest being chalcopyrite $CuFeS_2$, and possibly pyrite FeS_2 . The X-ray diffraction diagrams are shown in Appendix 1.

Conclusions:

All three sample stones met the requirements set in Decision 365/85 of the Ministry of Trade and Industry concerning allowable amounts of soluble heavy metals. All measured metal concentrations were clearly below the maximum limits set in the Decision, even though the solubility, specifically of lead and nickel, was seen to increase the greater the amount of sulphide minerals in the stone. This trend will presumably remain the same if the amount of sulphides continues to grow. Thus it would seem justified to take a cautious view of stone with a very high sulphide content where this can come into contact with foodstuffs.

Excluding the sulphide minerals the composition of all three sample stones was close to the ordinary quality of Nunnanlahti soapstone. Thus there is nothing in the main composition to prevent their use in connection with foodstuffs. Since according to the experiments the sulphides were virtually insoluble, and since no other health risks relevant to this situation could be found in the literature, there seem to be no clear obstacles, at least in terms of health, to this same stone being used in connection with the preparation and/or storage of food.

Espoo 7.5.1990

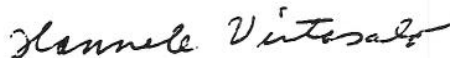
TECHNICAL RESEARCH CENTRE OF FINLAND
Building Materials Laboratory

Research Scientist



Pertti Koskinen

Technician



Hannele Virtasalo

APPENDICES: Appendix 1. X-ray diffraction diagrams of the soapstone samples.

X-ray diffraction diagrams of the soapstone samples

FILMS PM9940/00

Sample: K11Uu1 File: K11U1.RD

23-APR-90

Additional files: K11U2.RD K11U3.RD

