

## Chrysotile contents in serpentinite and dispersion of asbestos - comparison of methods of asbestos measurement in natural rocks-

# Kinya Kato[1]; Satoshi Okamura[1]; Takayuki Katoh[2]; Tetsu Wada[3]

[1] Sapporo, Hokkaido Univ. Educ; [2] Earth Sci. Co.; [3] Raax. Co.

Chrysotile, one of fibroid form asbestos, is an end member of the serpentine group. Recently, the health damage by the asbestos fiber was clarified, thus Japanese Government is prohibiting manufacturing, importing, transferring, offering, and using the product containing asbestos more than 0.1%. In tunnelling of hard rock such as serpentinite with much contents of chrysotile, how much asbestos fibroid are dispersed is unknown, and moreover the safety standards have not been established. We examined several methods of measurement of the asbestos provided depending on various environmental conditions, and evaluated those methods, modal analysis by the polarized microscope, X-ray diffraction (XRD) analysis, and the phase difference and decenralized microscope (PDDM) analysis. The analyzed sample consists of massive serpentinites, serpentine veins cutting massive serpentinite, weathering serpentinites, and foliated serpentinites. The modal analysis is a technique for calculating the mineral volume under the thin section. The XRD analysis is a technique for quantifying mineral contents by a calibration curve method using ground powder samples. The PDDM analysis is a technique for counting the asbestos fiber colored by an immersion liquid in ground powder samples.

In the comparison between the modal and the XRD analyses, there is good correlation in the range of 20-60 vol % chrysotile contents. On the other hand, some samples measured 100 vol % chrysotile contents by the modal analysis indicate less than 100 vol % (~50 vol %) chrysotile contents by the XRD analysis, by which a small amount of lizardite X-ray spectrum is detected. The difference between these methods, therefore, may result from the difficulty of identification of minute crystals by the optical microscope with up to 400 magnifications. Moreover, different degree of crystallinity of the chrysotile may cause uncertainty of the XRD quantitative analysis.

The PDDM analysis indicates that the fibroid asbestos contents in the almost ground powder samples are less than 4 % (number of asbestos fiber/total number of chrysotiles). This means that almost chrysotile crystals are broken to unfibroid grains by the process of grinding the samples. However, fibroid asbestos may have been dispersing in the atmosphere by the process of grinding samples. We trapped the asbestos disperses during the grinding samples in the draft, and counted the number of asbestos fiber by the PDDM analysis. The maximum number of the asbestos fiber is 49/L, which is less than the standards of the working environment concentration (No. 79 in the Ministry of Labor notification), 150/L. Asbestos disperses examination indicates that the moist condition tends to diminish the dispersion of asbestos compared to the dry condition.