SESSION VIII. MIXED EXPOSURES

59. Health and Exposure Surveillance of Siberian Asbestos Miners: A Joint Finnish-American-Russian Project

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Russia is the world's largest producer of chrysotile asbestos. The Uralasbest mining and milling complex in Asbest (near Ekaterinburg) produces over 25 percent of the total output, and it employs more than 10,000 workers. The capacity of Plants No. 4 and No. 6 exceeds one million tons/year. This collaborative study consisted of dust measurements at workplaces, X-ray examinations and lung function tests of long-term workers and tissue analyses from autopsies.

A total of 300 dust samples for microscopic analyses were taken by Finnish and American hygienists in addition to about 400 parallel gravimetric samples taken by the Russian colleagues. The mean concentration of airborne fibers was 0.08 f/cm³ in the quarry, 3.62 f/cm³ in Plant No. 4 and 0.63 f/cm³ in Plant No. 6 as measured by phase-contrast optical microscopy (178 samples). The parallel SEM results were about the same in the two production sites, 4.61 f/cm³ in Plant No. 4 and 0.69 f/cm³ in Plant No. 6 (79 samples). The mean levels of total dust were 0.52 mg/m³ in the quarry, 2.33 mg/m³ in Plant No. 4 and 0.83 mg/m³ in Plant No. 6 (475 samples). All identified fibers were chrysotile and no amphibole minerals were detected in the PCOM and SEM samples. Nonfibrous dust particles were mostly composed of serpentine minerals. The quartz concentration was below 1 weight-% as determined by X-ray diffractometry. During the past 20 years, a substantial decrease of dust levels was observed from the review of

about 43,000 gravimetric measurements made by the Uralasbest Company at various mining and milling operations.

By chest radiography, 2,003 long-term workers were examined and the X-ray films were classified according to the ILO 1980 system independently in Russia, Finland and USA. About 10% of the workers had small irregular opacities and 4% had pleural calcifications. The workers had been employed for more than 10 years in the chrysotile production or technical product manufacture. About 80% of the men (n=1253) and 3% of the women (n=750) were smokers. Their mean age was 47 years. Lung function measurements were made for about 500 workers. Over 50 persons with suspected pneumoconiosis or other diseases were referred to further clinical examinations. Lung tissue samples were collected from 21 former workers or residents from the Town of Asbest and the asbestos fiber concentrations were determined by scanning electron microsocopy. About half of the samples exceeded the background reference level of 1 million asbestos fibers/gram dry tissue.

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