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Eksponering for beryllium ved produksjon av primær aluminium

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English summary

In the period 2003 - 2004 potroom workers exposure to selected contaminants were measured at Elkem Aluminium Lista**,** Elkem Aluminium Mosjøen, Sør-Norge Aluminium, Hydro Aluminium Karmøy, Hydro Aluminium Årdal and Hydro Aluminium Høyanger as part of the HAPPA project. For the exposure assessment of airborne contaminants, sampling equipment following the international defined health related aerosol fraction criteria was used. In total, personal samples representing 1037 workers have been collected. From these, 30 samples with the highest inhalable mass from each of the Søderberg and prebake potrooms were selected for measurement of water-soluble Be and Al and alkali-soluble Be.
Be was measured by inductively coupled plasma optical emission spectrometry. When sampling one cubic meter of air, a detection limit for Be of 0.5 ng/m^3 could be obtained.

The concentration of Be in all of the health related aerosol fractions varied considerably between the plants, but also between potrooms within the same plant. The highest Be concentrations were measured in the prebake potrooms at Karmøy Plant were the geometric mean for the inhalable fraction was 112 ng/m^3. The highest Be concentration in the inhalable fraction, 270 ng/m^3, was also measured in the samples collected in the prebake potroom at Karmøy Plant.

There is a considerable variation in the ratio between water-soluble Al and water-soluble Be. At Karmøy Plant (with the highest air Be concentrations) this ratio is approximately 1500:1. This ratio may increase up to 12-14.000 :1 in other plants with lower air Be concentrations. This indicates that it is an enrichtment of Be to Al in the workroom air.

On average about 81% of Be is water-soluble and there are indications that the rest is present in non-water soluble bath particles.

The selection of Be samples from the HAPPA project represents a worst case scenario and thus the results for Be are not representative for workers exposure, in general. In order to obtain further exposure information all personal samples collected in HAPPA phase II at Norsk Hydro Sunndal og Norsk Hydro Karmøy have been analysed for water soluble Be. The geometric mean air concentrations of Be in the inhalable fraction were 19,7 (n=99) and 40,7 (n=103) ng/m^3, respectively. The highest measured concentrations in the full-shift inhalable fraction were 253 and 190 ng/m^3 of Be, respectively. The concentrations of Be in the aerosol itself were moderate with geometric mean values of 2,7 and 10 ng/mg, respectively.
To assess possible skin exposure to water soluble Be a number of wipe dust samples were collected from different surfaces in the two smelters. The concentrations of Be were similar to the concentration level found in the inhalable fraction; geometric mean values of 3,2 (n=43) and 10,5 (n=53) at Norsk Hydro Sunndal and Norsk Hydro Karmøy, respectively. The highest individual Be concentration in the deposited dust were 8,0 and 24,0 µg/g, respectively.

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