Finnish Institute of Occupational Health

Markku Klemetti
GTK Mineral Prosessing
Tutkijankatu 1

83500 OUTOKUMPU

Statement no. AR12-2011-173199

9th November 2011

OCCUPATIONAL HYGIENE MEASUREMENTS AT GTK MINERAL PROCESSING LABORATORY IN OUTOKUMPU

Finnish Institute of Occupational Health
Client Solution
Neulaniementie 4, P.O. Box 301, 70701 Kuopio
tel. +358 (0)30 4741, fax +358 (0)30 474 7474
Business ID 0220266-9, www.ttl.fi/Kuopio

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Summary

The fraction of crystalline silica was less than 1 % (weight %) of the respirable dust and the highest fraction of asbestos fibers in total dust was less than 0.01 % (weight %) during the blending of the pilot plant feed (Hannukainen Iron ore blend, Northland Resources).

Working conditions during the blending of the pilot plant feed were very dusty and conventional air measurement technique (IOM-foam sampler) showed malfunction during the measurement. The results of the IOM-sampler could not be given, because the amount of dust on membrane of the samplers exceeded the critical weight. The highest semi-quantitative results of the inhalable dust showed more than 57 times higher concentration of inorganic dust than Finnish occupational exposure limit value known to be hazardous within an eight hour period.

If dust levels are not possible to reduce using technical measures, employees have to be protected from inorganic dust, crystalline silica and asbestos fibers by using personal respirators, which are fitted with a class P3 particle filter.

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1. General

The objectives of the measurements were to determine the amount of respirable crystalline silica and asbestos fibers in the total dust. Measurements were taken by Occupational Hygiene Technician Juhani Rautiainen of the Finnish Institute of Occupational Health on 22 June 2011.

2. Conditions during measurement

The fraction of crystalline silica (under 5 µm) in respirable dust (weight %) and the fraction of asbestos fibers in total dust (weight %) were measured during the blending of pilot plant feed (Hannukainen Iron ore blend, Northland Resources).

3. Methods

The total dust sample was collected on a membrane filter by using 37 mm open face cassette. The respirable fraction (<5 µm) of the total dust was separated by liquid sedimentation, and the quartz content of the fine dust was analyzed by X-ray diffraction in the Aerosol laboratory of FIOH in Helsinki.

The samples of asbestos fiber were collected on membrane filter by using 37 mm open face cassette. The analyses of the sample were done by electron microscope at Finnish Institute of Occupational Health Aerosol laboratory in Helsinki.

4. Measurement results

Table 1 shows the respirable fraction of the total dust, fraction of crystalline silica in respirable dust (weight %) and the fraction of asbestos fiber in total dust (weight %) measured using a collection method at fixed measurement points.

Table 1. The respirable fraction of the total dust, fraction of crystalline silica in respirable dust (weight %) and the fraction of asbestos fiber in total dust (weight %) measured at fixed measurement points.

Measurement point	Time	The respirable fraction of the total dust, %	The fraction of crystalline silica in respirable dust, (weight %)	The fraction of asbestos fiber in total dust, (weight %)
Blending of pilot plant feed	11:13–11:42	45	< 1	-
Blending of pilot plant feed	11:11–11:43	47	-	-
Blending of pilot plant feed	11:13–11:41	-	-	< 0.01
Blending of pilot plant feed	11:11-11.44	-	-	< 0.01

- not measured or the sample was impossible to analyze

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5. Recommendations and conclusions

5.1 General

According to the Government Decree on Chemical Agents at Work (715/2001), the nature and amount of employee exposure must be determined. The workplace should, if necessary, take measurements for airborne contaminants and, whenever possible, biological exposure measurements. If the concentrations are greater than the limit values, the necessary measures to rectify the situation must be taken as quickly as possible, after which exposure should be re-examined. If the limit values are met, follow-up measurements should be taken as necessary in order to verify that the situation is stable. The higher the measured concentrations, the more measurements need to be taken.

5.2 Analysis of the results and reducing exposure

The fraction of crystalline silica was less than 1 % (weight %) of the respirable dust and the highest fraction of asbestos fibers in total dust was less than 0.01 % (weight %) during the blending of the pilot plant feed (Hannukainen Iron ore blend, Northland Resources).

Working conditions during the blending of the pilot plant feed were very dusty and conventional air measurement technique (IOM-foam sampler) showed malfunction during the measurement. The results of the IOM-sampler could not be given, because the amount of dust on membrane of the samplers exceeded the critical weight. The highest semi-quantitative results of the inhalable dust showed more than 57 times higher concentration of inorganic dust than Finnish occupational exposure limit value known to be hazardous within an eight hour period.

If dust levels are not possible to reduce using technical measures, employees have to be protected from inorganic dust, crystalline silica and asbestos fibers by using personal respirators, which are fitted with a class P3 particle filter.

Markku Linnainmaa
team leader
Work Environment Devolopment

Juha Laitinen
senior research scientist
Work Environment Devolopment

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6. Distribution

We will send this statement in triplicate for distribution to, among others, the following:

employer representative/occupational safety officer
employee representative/occupational safety representative
Occupational health care/physician, health care nurse

For information on reimbursement for occupational hygiene measurements as occupational health care costs, contact the Kela (Social Insurance Institution of Finland) Health and Social Security Department Occupational Health Care and Employer Benefit Fund Group at tel. +358 (0)20 43 411.

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