

Evaluation of potential risks of exposure to natural (asbestos) and man-made mineral fibres (MMMF) in different types of industries



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Aim

The “Concept of implement of the state policy for the elimination of diseases related with exposure to asbestos-containing dust for the period until 2020 and further perspective” was adopted by the order of the Government of the Russian Federation on January 28, 2013 № 79-r.

Evaluation of potential risks of exposure to asbestos and other mineral fibres in different types of industrial and nonindustrial buildings was performed as a part of activities in the field of the Russian National Asbestos Profile preparation.

Special attention was paid to personnel not involved in works with damage or destruction of fibres containing materials.

Materials and Methods

There were performed general surveys of numerous industrial and non industrial objects built in different time periods, including in particular:

- energetics enterprises (thermal and hydro power plants);
- glass production;
- tires production;
- chemical industry;
- food and beverage industry, tobacco production;
- perfume and cosmetic production;
- metallurgy;
- office and living buildings.

Materials and Methods

In all cases surveys were performed out of working periods, accompanied by destruction/damage of asbestos-containing materials.

Surveys included:

- general examination;
- sampling of possible asbestos containing materials;
- sampling of dust settled on the hard for regular cleaning horizontal surfaces;
- air sampling in selected cases;
- analysis of collected materials, settled dust and air samples by scanning electron microscopy with X-ray diffraction microanalysis.

Results

General surveys of different industrial objects demonstrated the main types of asbestos containing materials used in all kinds of industries:

- friable insulation coatings on surfaces with high temperature (mainly at objects constructed before 2000 and usually in process of replacement by another insulation materials, especially man-made mineral fibres containing insulation materials);



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- asbestos-cement corrugated and flat sheets, asbestos cement pipes



Results

General surveys of different industrial objects demonstrated the main types of asbestos containing materials used in all kinds of industries:

- asbestos technical and asbestos textile materials (gaskets, cords, ropes, yarns, cardboards)



Results

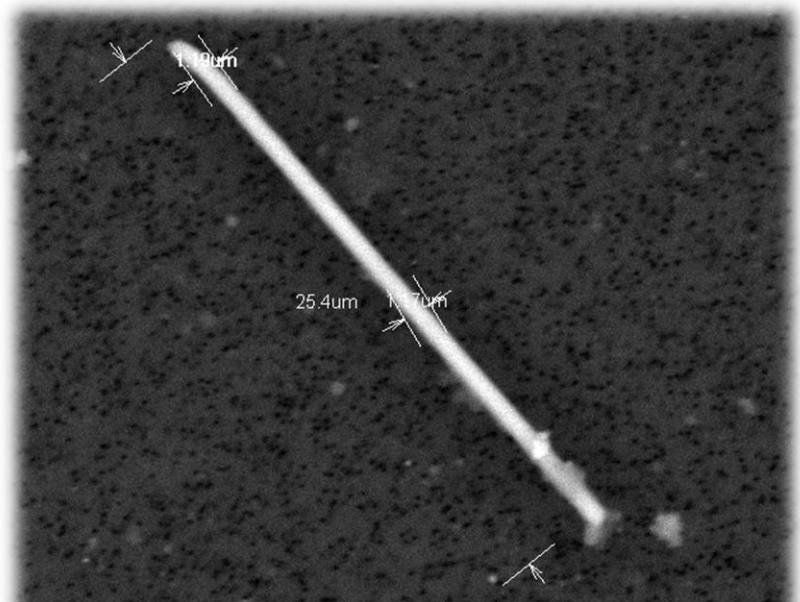
Air sampling at most examined industrial objects were made at periods when works, accompanied by destruction/damage of asbestos and other mineral fibres containing materials were not performed. In most cases fibres concentrations in working zone air were less than 0,001 fibres in milliliter except:

- compartments filled with sufficient amounts of damaged or uncovered asbestos contained friable thermal insulation materials – concentrations up to 0,1 f/ml;
- compartments filled with sufficient amounts of uncovered or damaged thermal insulation materials containing man-made mineral fibres (being used for more than 5 years) – concentrations up to 0,01 f/ml



Results

Air sampling at periods of works, accompanied by demolition of man-made mineral fibres containing materials, being used for more than 10 years on hot surfaces, demonstrated fibres concentrations in working zone air exceeding 10 f/ml.



TM-1000_3021 2012.03.14 D5.5 x5.0k 20 um

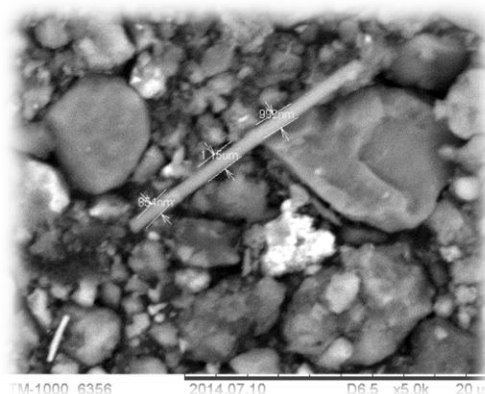


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Results

Analysis of samples of dust settled on the hard for regular cleaning horizontal surfaces collected in compartments where insulation materials containing chrysotile asbestos and man-made mineral fibres existed, demonstrated presence of sufficient amounts (more than 1% by weight) of both asbestos and man-made mineral fibres even in cases when concentrations of airborne fibres were less than 0,001 f/ml.

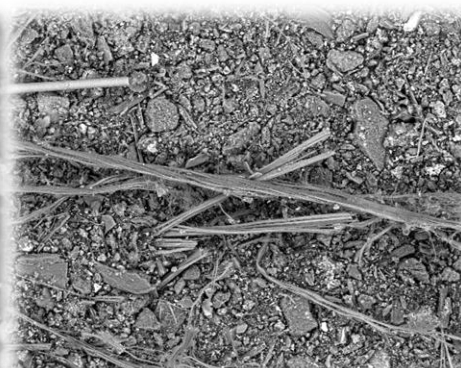
Amphibole fibres were found neither in air samples nor in settled dust samples nor in samples of possible asbestos containing materials.



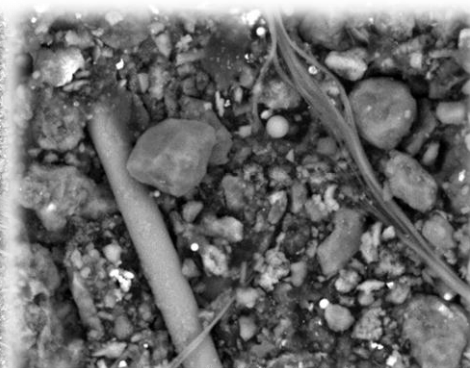
M-1000_6356 2014.07.10 D6.5 x5.0k 20µm



M-1000_6347 2014.07.08 D6.5 x3.0k 30µm



M-1000_5263 2013.08.28 D5.3 x500 200µm



M-1000_5469 2013.08.28 D5.2 x3.0k 30µm

Results

In general surveys of office and living buildings constructed in different years only in a few cases asbestos cement materials were found. The same situation concerned asbestos containing insulation materials in technical compartments.

Asbestos fibres concentrations in air samples were less than 0,001 f/ml.

In settled dust asbestos fibres were found also only in a few cases.



Results

At the same time insulation materials containing different types of man-made mineral fibres were found in practically all examined office and living buildings.

In samples of dust settled on horizontal surfaces collected at examined objects man made mineral fibres were detected and sufficient amount of them had “respirable” dimensions ($L > 5\mu\text{m}$., $D < 3\mu\text{m}$.)

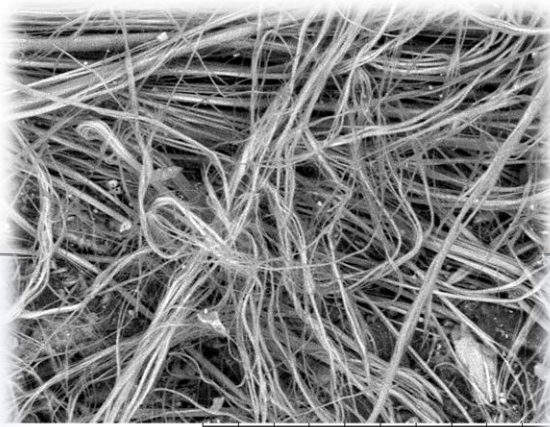


Awareness rising

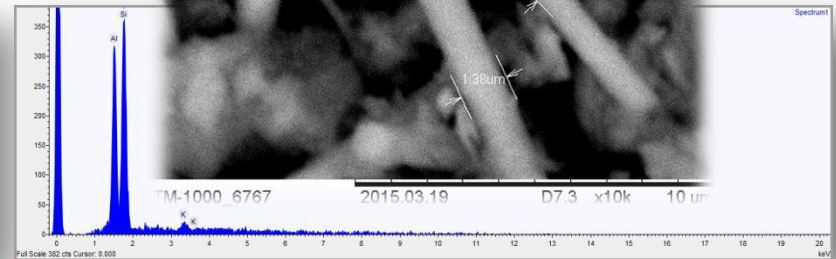
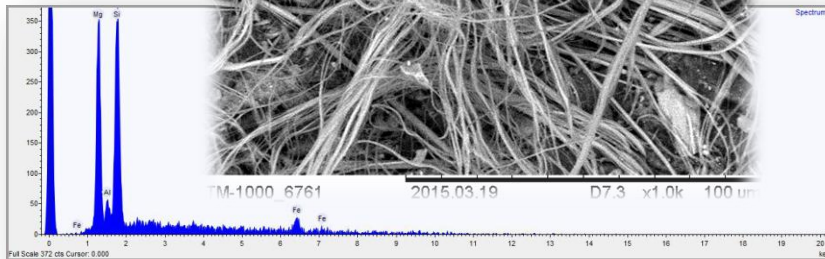
Chrysotile asbestos
(magnesium silicate fibres)
insulation board

Aluminum silicate
fibres (insulation)

We all die! Immediately!



Nothing serious?





Conclusion

In the Russian Federation friable asbestos containing insulation materials still perform sufficient source of exposure to asbestos fibres practically in all types of industries even in periods of absence of works, accompanied by destruction/damage of asbestos-containing materials.

In this regard they practically are not used in new construction for at least several decades, are not included to the list of asbestos containing materials recommended for use and are replaced by other insulating materials.



Conclusion

One of the most common alternatives are insulating materials containing different types of man made mineral fibres.

In specific cases such materials could be also sufficient source of risk of exposure to mineral fibres and not only in industrial but also in office and living buildings.

This points to the need for broader implementation of safety requirements in their use.



Conclusion

An additional method of identifying the possibility of air pollution of working zone in the initial or screening surveys of possible risks of exposure to mineral fibres is the determination of mineral fibres in samples of dust settled on the hard to regular cleaning horizontal surfaces.

Detected (not detected) mineral fibres in settled dust samples could be recognized as a reasonable indicator of presence or absence of possibility of air contamination by fibrous particles even when by the initial or screening air sampling mineral fibres were not detected.

Thank you for your attention





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