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# Asbestos: Realities, Problems and Recommendations

Safe Chemicals


in cooperation with
**WECF - Women in Europe for a Common Future**
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# ASBESTOS: REALITIES, PROBLEMS AND RECOMMENDATIONS

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## INTRODUCTION

***Asbestos*** is a generic name for crystalline fibrous silicate minerals of ***serpentine*** and ***amphibole*** groups. More than 90% of global asbestos production and trade are associated with ***chrysotile asbestos*** (or white asbestos) - a serpentine mineral of tabular silicates subclass.

Largest chrysotile deposits are located in Russia, Kazakhstan and Canada. Now, the EECCA region (East Europe, Caucasus and Central Asia) produces about 50% of the global chrysotile production.

The chrysotile industry of Russia and Kazakhstan incorporates 60 mining and processing facilities, including 41 facilities in Russia. Overall, the industry provides 48.5 thousand jobs and generates annually $800 million worth of products. About 500 thousand residents of EECCA countries directly depend on development of the chrysotile industry, including more than 400 thousand in Russia.

Overall, estimated explored deposits of chrysotile in Russia and Kazakhstan are assessed to reach 3079.6 million tons, or sufficient for 150 years of operation of the asbestos industry.

In 100 recent years, asbestos was intensively applied in construction. More than three thousand different products are produced from pure asbestos or composite asbestos-based materials, including plastic films, different fibres that are used for production of fabric, panels or heat and corrosion resistant coatings; electric insulators (e.g. for clutch and breaks parts), special protective gear, gas masks, etc.

Short asbestos fibres and dust are used as fillers to improve strength of different items, e.g. asbestos-vinyl floor coatings. Amphibole asbestos is used for production of filters and sealers for pipe joints in chemical industry, in welding rods and asbestos-based plastics.

Asbestos-cement plates (pressed asbestos and Portland cement) for a long time were used for construction applications (as construction and insulation materials).

Asbestos paper is also produced - white, elastic fire-resistant thin sheets of mixed asbestos and cellulose fibres, usually bonded by sodium silicate solution (liquid glass).

Workers of numerous industries have workplace exposure to asbestos, including the following types of exposure:

- "primary" - mining, clarification and milling;
- "production" - production of asbestos and asbestos-based products;
- "construction" - construction and installations works, e.g. installation of boilers, construction of pipelines;
- "environmental" - emissions of asbestos production facilities affecting nearby residents; demolition of constructions made with use of asbestos and asbestos-containing materials in violation of applicable regulations; uncontrolled disposal and releases of asbestos waste and dust;
- "household" - household applications of asbestos and asbestos-containing materials, e.g. use of asbestos for ironing boards.

In a human body asbestos fibres do not resolve and induce inflammatory processes.

The asbestos-induced occupational disease is called "***asbestosis***". Asbestosis patients have 5 times higher risks of lung cancer.

Smoking makes the above grim statistics even worse: incidence of lung cancer among smoking asbestos-exposed workers (with sufficient exposure levels to induce asbestosis), is 75 to 100 times higher comparatively to their non-smoking colleagues.

In the worst case, asbestosis evolves into malignant tumours (lung cancer or ***mesothelioma***). It is worth to note that development of a cancer occurs in many years after the moment of initial asbestos entry to lungs.

In 2002, Belgian medical researchers published results of their studies of asbestos-related diseases. They concluded that every seventh resident of developed countries is adversely affected by exposure to airborne asbestos dust.

UK trade unions estimated that at least 10 thousand people are expected to die from asbestos-related diseases in nearest 20 years. In recent four years, the number of asbestos victims reached 18 thousand persons.

According to the researchers, in Australia, Western Europe, US and Japan alone, the number cases of different lung diseases is expected to reach tens of thousands, inc. 60-70% of lung cancer while the rest of these potential cases are expected to be diagnosed mesothelioma. One may easily imagine the magnitude of "asbestos" cancer cases in developing countries and transition economies, than simply lack funds for prevention and early diagnostics of these diseases.

The International Agency for Research of Cancer (IARC) categorised chrysotile and amphibole asbestos as 1st category carcinogens (proven carcinogenic agents), similarly to cadmium, chromium, nickel compounds, vinyl chloride, iron/steel casting, rubber industry, etc.[1].

**Mesothelioma is traditionally considered as "the indicator disease" of asbestos exposure**[2,3,4]. According to one hypothesis, carcinogenic effects of asbestos are associated with its fibrous structure and depend on size of asbestos fibres. Asbestos fibres with length from 5 μm to 20 μm and less than 1 μm in diameter are assumed to cause adverse heath impacts, inc. carcinogenic effects[5].

In 1960s, in South Africa, 32 mesothelioma patients from the group of 33 were found to be either workers of crocodilite asbestos mining facilities or lived nearby these facilities.[6] In England, 53 % of the group of mesothelioma patients were found to have some asbestos exposure.

In the case of miners and workers of asbestos-clarification facilities, incidence of mesothelioma was 10 times lower comparatively to workers of a technical asbestos products plant, that also used crocodilite asbestos[7].

Besides occupational exposure, household exposure is also possible due to asbestos dust at workers' clothes, due to airborne asbestos from transportation-related releases, dust releases from spoil heaps, etc.[8] In some cases, mesothelioma was diagnosed among people living nearby asbestos facilities.

In 18 years (1960 - 1978) 245 cases of mesothelioma were registered among residents of Quebec province (with the overall population of about 6 million) where main Canadian asbestos mines are located[9]. In this case, 9.5 % of mesothelioma patients earlier were workers of asbestos facilities, while 15 % of patients potentially had occupational asbestos exposure as they maintained heating systems (asbestos dust may release from damaged thermal insulation coatings). A visible growth of cancer risks was identified for Canadian resident who live nearby asbestos-producing sites[10].

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[1] http://ukrchrysotile.com.ua/mifi_i_realnost.html
[2] *Lait R.U.* Pleural diseases. M.: Medithina, 1986. 376 p. (Rus.)
[3] *Antman K.N.* Natural history and epidemiology of malignant mesothelioma // Chest. 1993. Vol. 103, № 4. P. 373-376.
[4] *Attanoos R.L., Gibbs A.R.* Pathology of malignant mesothelioma // Histopathology. 1997. Vol. 30, № 5. P. 403-418.
[5] *Stanton M.* Biol. Effects of Asbestos // IARC Press, Lyon. 1973. № 8. P. 180-183.
[6] *Kogan F.M.,Berzin S.A.* Incidence of pleural mesothelioma under impacts of chrysotile asbestos dust // Occupational hygiene and occupational diseases. 1986. # 9. p. 9-12. (Rus.)
[7] *Kogan F.M.,Berzin S.A.* Incidence of pleural mesothelioma under impacts of chrysotile asbestos dust // Occupational hygiene and occupational diseases. 1986. # 9. p. 9-12. (Rus.).
[8] *Acheson E.D., Gardner M.J., Pippard E.S. et al.* Mortality of two groups of women who manufactured gas masks from chrysotile asbestos // Brit. J. Industr. Med. 1982. Vol. 39. P. 344-348.
[9] *Kogan F.M.,Berzin S.A.* Incidence of pleural mesothelioma under impacts of chrysotile asbestos dust // Occupational hygiene and occupational diseases. 1986. # 9. p. 9-12. (Rus.).
[10] *Wagner J.C., Sleggs C.A., Marchand P.* Diffuse pleural mesothelioma and asbestos exposure in the North Western Cape Province // Brit. J. Ind. Med. 1966. Vol. 17. P.260-271.

A similar trend was identified in the course of comparative analysis of mapped asbestos-processing sites and areas of higher incidence of pleural mesothelioma in 1968 - 1978[11].

Asbestos is widely used for production of different industrial products, inc. insulation materials, roofing plates, breaks pads, etc., however many people are not aware of their contacts with asbestos and associated health effects[12].

Intrapleural, inhalation or intratracheal introduction of asbestos of any type generate development of mesotheliomas for 8-66 % of test animals. In animal tests, mesothelioma incidence depends on introduced asbestos doses[13,14,15]. In histological terms, human mesotheliomas do not differ from mesotheliomas of test animals[16,17,18].

Experimental studies suggest that asbestos-induced carcinogenesis follows general patterns of chemical carcinogenesis with its "dose-effect" dependence (i.e. higher doses compensate lover exposure time and vice versa). Experimental results demonstrated that mesothelioma development risks increase sharply in the case of long-term exposure to low doses of asbestos comparatively to short-term or rare exposures to high doses[19]. These findings are in line with suggestions that mesothelioma may be induced by impacts of low levels of asbestos - as the newly identified risk groups suggest: drivers, car mechanics, railwaymen, construction workers, dentists[20,21,22].

Epidemiological studies demonstrated a correlation between higher risks of ovary cancer and use of talc-containing hygiene napkins, sprays, tampons and condoms.

T.H. Parmley proposed a concept that such malignant tumours as cystadenocarcinoma, papillary carcinoma and undifferentiated ovary cancer actually belong to mesotheliomas[23].

Accounting for mesothelium origin of ovary epithelium, D.L.Longo suggested histological similarity of ovary tumours and pleural/peritoneum mesotheliomas[24].

Epidemiological study of S.A.Ilicheva suggested a statistically significant (more than two-fold) increase of ovary cancer mortality risks among female workers of book-stitching shops[25].

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[11] *Kogan F.M.,Berzin S.A.* Incidence of pleura mesothelioma under impacts of chrysotile asbestos dust // Occupational hygiene and occupational diseases. 1986. # 9. p. 9-12. (Rus.).

[12] *Lait R.U.* Pleural diseases. M.: Meditsina, 1986. 376 p. (Rus.).

[13] *Pylev L.N., Kulagina T.F..* Blastomogenic activity of natural and synthetic asbestos in the case of introduction into hamster lungs // Experimental oncology. 1981. v. 3, # 1. p. 63-67. (Rus.)

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[19] *Pylev L.N., Stadnikova N.M., Kleimenova E.B. et al* .Intermitting action of asbestos dust and pleural carcinogenesis in rats // Hygiene and sanitation. 1994. # 7. p. 30-32. (Rus.).

[20] *Huncharek M.* The epidemiology of pleural mesothelioma: current concepts and controversies // Cancer Invest. 1989. Vol. 7, № 1. P. 93-99.

[21] *Jarvholm B.M., Englund A., Albin M.* Pleural mesothelioma in Sweden: an analysis of the incidence according to the use of asbestos // Occup. Environ. Med. 1999. Vol. 56. P. 110-113

[22] *.Nokso-Koivisto P., Pukkala E.* Past exposure to asbestos and combustion products and incidence of cancer among Finish locomotive drivers // Occup. And Environ. Med. 1994. Vol. 51, № 5. P. 330-334.

[23] *Parmley T.H., Woodruff J.D.* The ovarian mesothelioma // Am. J. Obstet. Gynecol. 1974. Vol. 120, № 2. P. 234-241.

[24] *Longo D.L., Young R.C.* Cosmetic talc and ovarian cancer //Lancet. 1979. Vol. 8138, № 2. P. 349-351.

[25] *Ilicheva S.A.* Epidemiology of malignant tumours in polygraphy: Summary thesis of a Candidate of Sciences (Medicine). M., 1998. 143 p. (Rus.)

Accounting or these findings and her own observations, S.A.Ilicheva[26] suggested a hypothesis on a causal relationship between exposure to magnesium hydrosilicates (inc. talc and asbestos) and risks of development of ovary cancer and mesothelioma.

In regional terms, incidence of mesothelioma cases is rather dissimilar. For example, in the USA, male/female ratio of mesothelioma cases reaches 9:1, while in some other countries (e.g. UK, France and Australia) the ratio is lower[27]. Mesothelioma incidence among women in the USA reached 2-3 cases per million/year and the level remained stable for 30 recent years[28]. Mesothelioma was registered more often among men in the North America - 20 cases per million/year. In the latter case, mesothelioma incidence gradually increased to 1990s and reached its maximal level, while in recent years the incidence tends to decrease[29] - the decrease is attributed to a more early ban for asbestos use.

In terms of mesothelioma incidence, the situation in US and Canada differs from Australia, France and UK - in the latter group of countries, the number of cases is much higher and continues to rise. For example, in Australia in 1993 - 1997, at average, 23 mesothelioma cases per million were registered among men and 3 cases per million among women[30]. In 2000, these figures increased to 60 cases per million among men and 11 cases per million among men[31].

In Europe, different countries substantially vary in terms of mesothelioma incidence. According to IARC, in 1993 - 1997, the highest incidence of mesothelioma among men was registered in Scotland and the Netherlands (34 cases per million), while in Estonia and Byelorussia only 3 cases per million were registered[32]. In the same period of time, the highest mesothelioma incidence among women was registered in Italy - 9 cases per million[33]. In the group of developed Western Europe countries, only situation in Sweden is similar to that in the USA[34]. In 1993 - 1997, the morbidity level among men in Sweden reached 13 cases per million, while the morbidity among women reached 3 cases per million[35], however, in recent years, these figures tend to decrease[36,37]. Since 1976, import of asbestos to Sweden started to decrease, while in other industrialised European countries these years were the years of maximal asbestos application (the trend extended to 1990s)[38].

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[26] *Ilicheva S.A.* Epidemiology of malignant tumours in polygraphy: Summary thesis of a Candidate of Sciences (Medicine). M., 1998. 143 p. (Rus.).

[27] *Travis W.D., Brambilla E. et al.* Tumours of the Lung, Pleura, Thymus and Heart. Pathology & Genetics. WHO Classification of Tumours. IARC Press, Lyon, 2004. P. 125-136.

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[29] *Travis W.D., Brambilla E. et al.* Tumours of the Lung, Pleura, Thymus and Heart. Pathology & Genetics. WHO Classification of Tumours. IARC Press, Lyon, 2004. P. 125-136.

[30] *Parkin D.M., Whelan S.L., Ferlay J. et al.* Cancer Incidence in Five Continents. IARC Press, Lyon, 2002. Vol. 8 P. 456-468.

[31] *Leigh J., Davidson P., Hendrie L. et al.* Malignant mesothelioma in Australia, 1945-2000 // Am. J. Ind. Med. 2002. Vol. 41. P. 188-201.

[32] *Parkin D.M., Whelan S.L., Ferlay J. et al.* Cancer Incidence in Five Continents. IARC Press, Lyon, 2002. Vol. 8 P. 456-468.

[33] *Parkin D.M., Whelan S.L., Ferlay J. et al.* Cancer Incidence in Five Continents. IARC Press, Lyon, 2002. Vol. 8 P. 456-468.

[34] *Hemminki K., Li X.* Mesothelioma incidence seems to have levelled off in Sweden // Int. J. Cancer. 2003. Vol. 103. P. 145-146.

[35] *Parkin D.M., Whelan S.L., Ferlay J. et al.* Cancer Incidence in Five Continents. IARC Press, Lyon, 2002. Vol. 8 P. 456-468.

[36] *Hansen H.H., Bunn P.A. Jr. et al.* Mesothelioma. Lung cancer therapy annual // Taylor & Francis. 2005. P. 127-140.

[37] *Hemminki K., Li X.* Mesothelioma incidence seems to have levelled off in Sweden // Int. J. Cancer. 2003. Vol. 103. P. 145-146.

[38] *Hansen H.H., Bunn P.A. Jr. et al.* Mesothelioma. Lung cancer therapy annual // Taylor & Francis. 2005. P. 127-140.

In Norway, mesothelioma development risks still continue to rise among men and women, albeit at a lower level. High morbidity levels were observed in groups of population born in 1935, while the risk remained stable in all other age groups[39].

Estimates suggest that mesothelioma incidence in Western Europe will peak in 2015 - 2030[40], and about 250 thousand people are expected to die from asbestos-induced mesotheliomas in the nearest 35 years[41,42,43]. Men born in 1945 - 1950 are expected to face the highest mesothelioma risk.

In UK, mesothelioma morbidity is expected to peak in 2015 - 2020 at the morbidity level of 2000 case/year[44].

**In recent years, many international organisations altered their attitudes to asbestos.** As early as in late 1990s, the International Labour Organisation (ILO) and the World Health Organisation (WHO) conducted their own research studies of health impacts of asbestos and decided to ban amphibole asbestos. There was no more amphibole asbestos in international trade after 1997, when the last crocidolite mines in South Africa closed. Since then it's been all chrysotile asbestos. However in June 2006, 95th General Conference of ILO endorsed the Resolution on Asbestos - in the Resolution ILO actively promotes a global ban for all types of asbestos.

In October 2006, WHO published its Political Statement on Elimination of Asbestos-induced Diseases. The Statement acknowledges health hazards of asbestos and call for a global ban for application of all types of asbestos as the most efficient way to eliminate asbestos-induced diseases. WHO insists on a broad dissemination of information on safe alternatives to asbestos and calls for development of economic and technological mechanisms to promote asbestos substitution processes. WHO recommends to incorporate these measures into national plans and strategies for elimination of asbestos-induced diseases. WHO co-operates with ILO for implementation of the Resolution on Asbestos and co-operates with other organisations for complete elimination of asbestos-induced diseases[45].

Now, the World Health Organisation, the International Labour Organisation, the International Chemical Security Program, the European Union, the International Social Security Association, the World Trade Organisation, the International Occupational Health Commission, the International Federation of Construction and Timber Workers, the International Federation of Metallurgy Workers and governments of more than 40 countries call for banning all types of asbestos. Referring to findings of numerous research studies they call countries to cancel asbestos mining and abandon production and use of asbestos-containing products.

What is the situation in the sphere of so called "asbestos problems" in transition economies, namely Russia, Ukraine, Kazakhstan and Kyrgyzstan? Would these countries follow the path of the West Europe and abandon asbestos mining and use or opt to preserve these industries as leading industrial sectors of their economy?

To answer these and other questions pertaining to "asbestos problems", a survey was conducted to study production, application, import and export of chrysotile asbestos in Russia, Ukraine, Kazakhstan and Kyrgyzstan (**Chapter 1**).

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[41] *Peto R., Darby S., Deo H. et al.* Smoking, smoking cessation, and lung cancer in the UK since 1950: combination of national statistics with two case - control studies // B.M.J. 2000. Vol. 321. P. 323-329.
[42] *Peto J., Hodson J.T., Matthews F.E. et al.* Continuing increase in mesothelioma mortality in Britain // Lancet. 1995. Vol. 345. P.535-539.
[43] *Peto J., Decarli A., Levi F. et al.* The European mesothelioma epidemic // Br. J. Cancer. 1999. Vol. 79. P. 666-672.
[44] *Peto R., Darby S., Deo H. et al.* Smoking, smoking cessation, and lung cancer in the UK since 1950: combination of national statistics with two case - control studies // B.M.J. 2000. Vol. 321. P. 323-329.
[45] http://www.who.int/occupational_health/publications/asbestosrelateddiseases

Research information on health impacts of asbestos prepared by national experts allows to understand asbestos health effects, the scale of asbestos-induced morbidity in these countries and options to prevent these diseases **(Chapter 2).**

The analysis of the due national legislation of our countries in the sphere of regulation of asbestos production and use provides an insight into underlying legal framework for the inter-agency approach to asbestos management and prevention of its adverse impacts (**Chapter 3**).

Besides that, a survey in **Chapter 4** provides information on international regulation in the sphere of asbestos management.

Positions of international and national NGOs on the problem of asbestos are shaped by the fact that promotion of industrial interests effectively kills the key objective of the Rotterdam Convention, making profits a higher priority than public health. They believe that only a complete ban on production and trade in asbestos-containing products - regardless specific types of asbestos used - may substantially reduce asbestos-induced morbidity (**Chapter 5**).

We hope that **the Recommendations and the Call for Action** proposed by the Survey and developed in the course of numerous consultations with experts and multi-sectoral discussions would allow to identify a path to address the "asbestos problem" in Russia, Ukraine, Kazakhstan and Kyrgyzstan, as well as in other transition economies.

## Chapter 1

## PRODUCTION, APPLICATION, IMPORT AND EXPORT OF CHRYSOTILE ASBESTOS

### RUSSIA

#### Asbestos production

Russia belongs to the group of largest global producers of chrysotile asbestos. Largest global operational deposits of chrysotile asbestos include: Bazenovskoye deposit (Middle Urals), Kiembaevskoye deposit (Orenburg Oblast) and Ak-Dovurakskoye deposit in Tuva with asbestos reserves estimated to reach 78 million tons or 71 % of the overall asbestos deposits in the country. Molodeznoye deposit with exceptionally long-fibre asbestos was found in the northern part of Chita Oblast. Chrysotile deposits are also located within the serpentine belt of Eastern and Western Sayan Mountains and in the Northern Caucasus. In total, 11 deposits are registered in Russia with balance reserves of 110 million tons of asbestos (as at 01.01.1999).

Asbestos mining is Russia is dominated by two major mining and processing facilities (Uralasbest and Orenburgasbest) with the overall annual production capacity (inc. asbestos of 0 to 6th groups) of 1,060 tons (as at 01.01.99). Actually, in 1996-1998, they produced 600 - 700 tons/year, with capacity utilisation of 60%.

**Bazenovskoye deposit in Sverdlovsk Oblast** has been exploited since 1889. Proven asbestos reserves there are assessed to reach about 66 million tons (with average asbestos content of 2.28 %). Annual asbestos production reaches about 530 thousand tons or 24 % of global asbestos mining and 60 % of the overall asbestos production in the Russian Federation. Asbestos mining operations are concentrated around the city of Asbest.

Bazenovskoye deposit of chrysotile asbestos is located at the distance of 60 km to the North-East from Yekaterinburg. The deposit is located within a meridionaly extended ultrabasic rock mass (known under the same name) for 28 km, with 1 - 4 km width, the surface area of the deposit reaches about 75 $km^2$. In term of asbestos content and explored asbestos reserves Bazenovskoye deposit is the larges in the World.

Chrysotile asbestos is produced there by "Uralasbest" Mining and Clarification Plant. The plant is the largest global producer of chrysotile asbestos and controls about a quarter (24 %) of the global

asbestos production and more that 50 % of chrysotile asbestos production in Russia. "Uralasbest" Co. incorporates 15 structural units, including the plant management facility, clarification, blasting, repairs, energy supply and other facilities. Annually, 10 thousand workers of the plant produce 530 thousand tons of chrysotile asbestos. "Uralasbest" Co. produces more than brands of asbestos (with different fibre length), as well as crashed rock, sand and grit mixtures, sand for construction applications, roof dressing gritting, etc.

The already excavated rock at the deposit made it the largest open cast mine in Europe: 11.5 km in length, 1.8 km in width and 310 m in depth. Asbestos is excavated there from the huge pit of about 300 m in depth at estimated annual capacity of 37.8 million tons of raw asbestos-containing rock or 1.4 million tons of chrysotile asbestos. Local clarification facilities produce chrysotile asbestos from the raw asbestos-containing rock.

**Kiembaevskoye deposit of chrysotile asbestos in Orenburg Oblast** was found in 1936. Proven asbestos reserves are assessed at the level of 24.9 million tons at the average asbestos content of 1.9 - 4.8 %. Open cast asbestos mining is used at the deposit. Asbestos reserves of the deposit reach about 17 % of Russian national reserves. Asbestos mining operations are concentrated around Yasniy town.

"Ogenburg Minerals" Co. was established at the base of the deposit for mining and clarifying operations with chrysotile asbestos. In 2006, growth rate of mining operations and production of chrysotile fibres reached 5 % comparatively to 2005 and production of final products reached the estimated capacity - 500 thousand tons of chrysotile asbestos annually.

**Ak-Dovurakskoye deposit of chrysotile asbestos in the Republic of Tuva.** At the base of the deposit, "Tuvaasbest" Plant was established with annual production capacity of 20 thousand tons of asbestos (mainly textile-grade asbestos brands). Now, the future fate of "Tuvaasbest" Plant is being disputed. According to the plant owners, up to 2005, the facility stagnated. The plant was heavily indebted by all types of payments, the plant property was either looted or declined due to unstable production operations and a year-long idle time. Investors - "Enkor" Co. and its daughter company "Asbestos" Siberian Co. (from spring of 2007) - invested more than 100 million roubles into equipment modernisation, repay of debts (inc. tax and wage arrears), but the plant has failed to meet expectations of the investors. Now, the plant undergoes liquidation procedures**.**

**Molodeznoye deposit in Chita oblast.** Molodeznoye asbestos deposit is located in the central part of the rock mass of the same name. At different depths, length of the asbestos-bearing rock varies from 409 to 768 m, width - from 278 to 489 m, while the depth varies from 367 to 638 m from the land surface. The maximal size of the deposit was found at the depth of +1150 m.

**Dynamics of chrysotile asbestos production in Russia** (thousand tons)

| Year | Russia overall | "Ogenburg Minerals" Co." | "Tuvaasbest" | "Uralasbest" |
|---|---|---|---|---|
| 2000 | 751.8 | 290.0 | 2.2 | 459.6 |
| 2001 | 735 | 297.0 | 2.4 | 435.6 |
| 2002 | 778.2 | 302.1 | 1.3 | 474.8 |
| 2003 | 876.1 | 370.6 | 7.9 | 497.6 |
| 2004 | 922.8 | 408 | 10.8 | 504 |
| 2005 | 997.25 | 460.25 | 5.4 | 531.6 |
| 2006 | 1045.8 | 516 | 2.5 | 527.3 |
| 2007 | 1025.5 | 518.2 | 4.2 | 503.1 |

**Application of asbestos in Russia**

There are deposits of serpentine and amphibole asbestos in Russia, while only chrysotile asbestos is produced and applied in the industry. Overall, 41 interrelated facilities (inc. 3 asbestos mining and clarification facilities, 24 asbestos-cement plants, 9 plants of asbestos-based technical items, 2

factories producing asbestos-cardboards which are used as thermal insulation and in the construction industry, and 3 technologic institutes) employ about 38.5 workers. Many of these plants are city-forming ones. Accounting for the latter factor, participation in production of asbestos-containing products affects social interests of more than 400 thousand persons.

According to the US Geological Survey, in 2000, Russia used 447 thousand tons of asbestos (or 3.4 kg per capita/year) and produced 804,800 tons. In 2003, asbestos production in Russia reached 878 thousand tons (according to Mineral Yearbooks).

More than two thirds of produced asbestos in Russia are used for production of asbestos-cement items (corrugated asbestos-cement sheets and pipes). Asbestos-cement is a composite material containing Portland cement (80-90 %), chrysotile asbestos (10-20 %) and water. For production of coloured corrugated asbestos-cement sheets some pigments are added to the mix (2.3 - 4.2 % mass). Chromium oxide, red iron oxide, etc. are used as pigments. Cr+6 is also carcinogenic to the lungs, like asbestos.

Asbestos-cement producers are key consumers of asbestos at the domestic market (200 thousand tons/year). As at 01.01.99, their manufacturing capacity reached 4,446 standard asbestos-cement sheets and 31.5 thousand km of standard pipes. In 1998, they produced 1,262 million standard sheets of corrugated asbestos-cement and 7,135 km of standard asbestos-cement pipes, utilising 30% of their production capacity. These facilities employed 11 thousand workers and produced 1,007 million roubles worth of products in 1998. In the first quarter of 1999, production of corrugated asbestos-cement sheets increased by 35 % comparatively to the first quarter of 1998.

Eight of 24 asbestos-cement plants are major facilities and produce 75 % of corrugated asbestos-cement sheets in Russia (Sebryakovskiy, Belgorodskiy, Volskiy, Ulianovskiy, Sukholozhskiy, Alekseevskiy, Krasnoyarskiy and Kirkinskiy plants).

In the construction sector, the share of asbestos-cement sheets in the overall application of roofing materials reaches 52 %, they are used due to their lower costs and labour intensity of associated roofing works.

In the Russian Federation, 95 thousand km of asbestos-cement pipes are used in water distribution networks (or 19 % of their overall length). There is some experience of application of asbestos-cement pipes for heating networks as well.

The second largest sector of application of asbestos includes production of different asbestos-based technical/textile items: brake pads, sealers, fibres, cloth, cord, heat/sound-proof materials. Until recently, production of such items was fairly common in asbestos industry in Russia and elsewhere.

**"Volzhskiy Plant of Asbestos-based Technical Items" Co. (VATI).** From the initial days of its operation, the plant was the base production facility of VNIIIATI - a leading R&D institute of the country. The plant conducted industrial testing of almost all domestic asbestos-based technical items. It was the first Russian facility that launched production of **asbestos-free paronite** which is a sheet material produced during compression of caoutchouc and some other powder components. In recent years, the institute developed **asbestos-free friction materials for brake lining in high-load MAZ and Super-MAZ trucks**. A technology was developed and production process was tested for production of **asbestos-free ellipse-winded clutch friction pads for cars.** Production of new types of asbestos-based technical items was put into operation - brake friction pads for bikes, KRAZ, KAMAZ, GAZ and ZIL trucks, electric trams. The facility exports about a third of its products to EECCA countries and other foreign countries, business relations are well established with Moldova, Uzbekistan, Armenia, Azerbaijan, Tajikistan, Georgia, Kyrgyzstan and Kazakhstan.

**"Urals Auto-textile Products Plant" Co.** was established in 1942 and now the plant is a major Russian producer of friction items, sealing, insulation and heat-proof materials. "Urals ATI" Co. maintains certified quality control system in line with ISO 9001 international standard.

The range of main customers of the facility's products in Russia and EECCA countries incorporates: railways, automobile plants, metallurgic and chemical plants, oil refineries, nuclear, thermal and hydroelectric power plants, shipyards and many others.

The company successfully operates at the international market (inc. Turkey, Syria, Iran).

"Urals ATI" Co. operates its own testing facility, allowing to test and adjust its products for improvement of their quality. The central laboratory of the plant was issued a certificate of the RF State Committee for Standards. The laboratory ensures permanent quality control of raw asbestos and finished goods. Products under certification requirements (break pads and lining, brake bands, asbestos-based fabric) are issued certificates of compliance.

**"Barnaul Asbestos Technical Items Plant" Co.** is the most Eastern asbestos plant in Russia in terms of its geographic location and belongs to leading Russian and EECCA producers of asbestos-based and asbestos-free friction items, as well as some sealing materials.

The plant produces a broad range of asbestos-based and asbestos-free friction, sealing and heat-proof materials (overall, more than 1000 different brands). The industrial crisis in 1995 - 1998 caused a general production decline of the plant. However, in 1999, the plant won the contest for the best product of Altai region and in early 2000 it reopened its production line for brake pads for railway carriages, generating 150 new jobs.

**Asbestos export**

Russia exports produced asbestos to: Algeria, Angola, Azerbaijan, Armenia, Belarus, Brazil, Vietnam, Ghana, Egypt, India, Indonesia, Iran, Kazakhstan, China, Kyrgyzstan, Cuba, Malaysia, Moldova, Mongolia, Morocco, UAE, Oman, Pakistan, North Korea, Syria, Thailand, Tajikistan, Turkey, Tunisia, Uzbekistan, Ukraine, Philippines, Sri Lanka, Yugoslavia and South Korea.

In the period from 2000 to 2007, "Uralasbest' Co. - the largest producer of the Russian mining and clarification complex - increased its chrysotile asbestos sales to India in 3 times - from 22.4 thousand tons to 61.2 thousand tons.

"Orenburgasbest" Co. - the second largest Russian producer - in 2000, supplied 290.914 thousand tons of chrysotile asbestos (inc. 60.224 thousand tons sold to foreign countries outside the EECCA region.)

Now, in terms of geography, imports of chrysotile asbestos do not demonstrate any substantial changes. Main final destinations of asbestos export flows still include Thailand (about 28 thousand tons), China (more that 11 thousand tons), India (about 9 thousand tons), Indonesia (over 6 thousand tons), as well as Vietnam, Turkey, Hungary and Romania[46].

**Russia does not expand its asbestos export market, as the overall global production capacity remains stable, while application of asbestos demonstrates a stable declining trend.**

Besides export, asbestos is also supplied to domestic facilities in Russia. For example, "Uralasbest" Co. - the largest asbestos producer with the annual production capacity of 530 thousand tons of asbestos - exports a half of produced asbestos, while the other half remains at the domestic market. The company supplies its asbestos to **24** asbestos-cement plants, **9** producers of asbestos-based technical items and **2** producers of asbestos-cardboard products in Belgorod, Novosibirsk oblast, Krasnodar, Mordovia, Moscow oblast, Sverdlovsk oblast, Krasnoyarsk, Saratov oblast, Samara oblast, Chelyabinsk oblast, Novorossiisk, Kemerovo oblast, Volgograd oblast, Bashkortostan, Buriatia, Barnaul and Yaroslavl.

Some representatives of asbestos-processing facilities warn that Russia faces a serious threat of illegal import of construction materials, containing amphibole asbestos (already banned) and

[46] http://yasnii.narod.ru/gazet/yasnvest1.html

contaminated chrysotile asbestos, that might produce additional and substantial adverse health impacts.

It is important to note that such materials might be supplied disguised - as products of well known producers, e.g. Barnaul Asbestos Technical Items Plant or Volzhskiy Plant of Asbestos-based Technical Items.

**Asbestos-containing waste**

**Generation, composition and quantity of asbestos-containing waste**

Asbestos production operations and asbestos application in items and materials are accompanied by generation of asbestos-containing waste. In the course of asbestos mining and clarification, two types of waste are generated: overburden (***mining waste***) and ***clarification waste***.

In terms of chemical composition, these types of waste are hydrated magnesium silicates and should be utilised. Overburden (mining waste) may be used for filling of exhausted open-cast mines and production of crushed rock, while clarification waste may be used for production of construction materials (e.g. crushed rock, sand) and for production-related purposes at land roads and railways.

Asbestos-cement production operations generate wet, dry, dust and other types of waste. Solids in wet asbestos-cement waste are represented by cement hydration products and asbestos fibres, while associated liquids contain calcium and sodium hydroxides and sulphides with low concentrations of potassium chromate. A some part of wet waste is returned to production processes while the rest is disposed off.

Dry waste is generated by understandard and damaged asbestos-cement items, while asbestos-containing dust is generated by mechanical processing of asbestos-cement pipes and sheets, or emptying asbestos bags. The both types of waste are partly utilised as fillers in concrete constructions.

In the course of production of asbestos-based technical items, waste generation accompanies production of asbestos-based fabric, friction items and poronite (generally fibres and cut pieces). The bulk of such waste could be reprocessed with use of specialised equipment and reused in the mainstream production as additives, while some part of waste is disposed off.

Production of asbestos-based cardboard and paper is accompanied by generation of wet and dry waste that could be partly utilised and reused in the mainstream technological process.

**Categorisation of asbestos-containing waste by toxicity**

According to the Provisional Classifier of Toxic Industrial Waste and Methodological Recommendations for Identification of Toxicity Classes of Industrial Waste No. 4286-87, **all asbestos-containing waste in Russia may be categorised as 3rd and 4th hazard classes**[47]**.**

3rd hazard class (moderate hazard) includes:

- asbestos waste;
- asbestos fabric, rove, yarn, thread, cord, fibres;
- sealing materials and sealers, sleeves.

4th hazard class (low hazard) includes:

- waste asbestos-containing paper and cardboard and relevant items (asbestos cardboard, asbestos paper, filter plates, filter fibres);
- tar-paper, ruberoid and bitumen-impregnated paper;
- asbestos-cement waste (pipes, sleeves, corrugated and plain sheets, chips, broken items);
- crushed rock, asphalt-concrete and sand-grit mixtures, coarse roof gritting);

[47] MU 2.1.7.1185-03. Methodological Recommendations "Collection, Transportation and Burial of Asbestos-containing Waste". http://www.newgorod.net/documentation/category/1421/1561/ (Rus.)

• waste clutch discs and break pads (friction and break lining; break pads and bands; friction bushing, rings and washers; pressed asbestos-based items, asbestos-based friction compositions);
• rubber-asbestos items (paronite, paronite washers), asbestos-steel sheets, armoured fabric, broken/cut waste);
• mineral fibres, yarn and fabric (asbestos-glass and asbestos-polyester bands, asbestos and asbestos-rubber sleeves, asbestos-graphite rings);
• asbestos-containing grinding dust, asbestos-contaminated mineral dust.

Asbestos mining and clarification operations in Russia are associated with excavation and movement of huge amounts of overburden rock (about 80% of overburden rock are dumped). Shares of waste generation in asbestos-cement industry (the industry consumes more than 50% of all asbestos produced) vary from 2 to 15.5% of the raw asbestos input; while production of asbestos-based technical items generates up to 35% of waste.

Air emissions of asbestos-containing waste still remain a fairly serious problem. For example, **"Volzhskiy Plant of Asbestos-based Technical Items"** alone emits annually 6.5 tons of asbestos-containing dust.

The problems of utilisation of asbestos-containing construction waste is equally serious. For example, in Volgograd oblast, production facilities dump such waste into waste collection ponds. Some facilities dump these wastes into waste ponds or directly pour out wastes on roads.

On October 30, 2007, construction of a unique magnesium production plant of "Russian Magnesium" Co. was launched in Asbest - the plant is expected to use asbestos waste as a production input and produce 70 thousand tons of magnesium annually.

So far, China was the largest global magnesium producer. Now, its monopoly is threatened. Urals scientists developed know-how for modern magnesium production technologies. Magnesium will be produced there from huge stockpiles of asbestos production waste (their annual generation and accumulation reaches several million tons). Magnesium contents in asbestos waste are 5 to 6 times higher comparatively to natural cornolite.

Besides magnesium, asbestos production waste will be used for production of silicone, nickel, cobalt, chromium and even iron [48].

## UKRAINE

Ukraine does not have asbestos deposits of its own and producers of corrugated asbestos-cement sheets, pipes and other items import asbestos from the Russian Federation and Kazakhstan.

Shares of imported asbestos from these countries reached 61 % and 39 % in 2006 and 67 % and 33 % in 2007 of the overall asbestos import. Asbestos is primarily imported as fibres, flakes and powder.

See information on import and export of asbestos in Ukraine in 2006 and 2007 in tables 1.1 and 1.2[49]

[48] http://obltv.ru/plugins/news/view/id/1891.htm
[49] Data of the State Committee of Ukraine for Statistics, 2008.

Table 1.1

**Export/import of asbestos in Ukraine in 2006**

| Countries | Units of measure | Export | | Import | |
|---|---|---|---|---|---|
| | | Weight | Monetary eq., $US thousand | Weight | Monetary eq., $US thousand |
| **2524000000 Asbestos** | | | | | |
| **Total** | kg | **97201.00** | **19.03** | **108826235.00** | **31262.09** |
| I. *CIS countries* | kg | 97150.00 | 19.02 | 108826235.00 | 31262.09 |
| Kazakhstan | kg | - | - | 42837375.00 | 11257.42 |
| Moldova | kg | 97105.00 | 18.52 | - | - |
| The Russian Federation | kg | 45.00 | 0.50 | 65988860.00 | 20004.67 |
| *II. Other countries* | kg | 51.00 | 0.01 | - | - |
| *Europe* | kg | 44.00 | 0.01 | - | - |
| Latvia | kg | 44.00 | 0.01 | - | - |
| *Africa* | kg | 7.00 | 0.00 | - | - |
| Liberia | kg | 7.00 | 0.00 | - | - |
| **2524003000 Fibres, flakes, powder** | | | | | |
| **Total** | kg | **97201.00** | **19.03** | **108826235.00** | **31262.09** |
| *I.CIS countries* | kg | 97150.00 | 19.02 | 108826235.00 | 31262.09 |
| Kazakhstan | kg | - | - | 42837375.00 | 11257.42 |
| Moldova | kg | 97105.00 | 18.52 | - | - |
| The Russian Federation | kg | 45.00 | 0.50 | 65988860.00 | 20004.67 |
| *II. Other countries* | kg | 51.00 | 0.01 | - | - |
| *Europe* | kg | 44.00 | 0.01 | - | - |
| Latvia | kg | 44.00 | 0.01 | - | - |
| Africa | kg | 7.00 | 0.00 | - | - |
| Liberia | kg | 7,00 | 0,00 | - | - |

Table 1.2

**Export/import of asbestos in Ukraine in 2007**

| Countries | Units of measure | Export | | Import | |
|---|---|---|---|---|---|
| | | Weight | Monetary eq., $US thousand | Weight | Monetary eq., $US thousand |
| **2524000000 Asbestos** | | | | | |
| **Total** | kg | **81231.0** | 35.2 | **81499533.0** | **25293.9** |
| *I. CIS countries* | kg | 70000.0 | 26.7 | 81499533.0 | 25293.9 |
| Kazakhstan | kg | - | - | 26647500.0 | 7752.4 |
| Moldova | kg | 70000.0 | 26.7 | - | - |
| The Russian Federation | kg | - | - | 54852033.0 | 17541.5 |
| *II. Other countries* | kg | 11231.0 | 8.6 | - | - |
| *Europe* | kg | 24.0 | 0.0 | - | - |
| Malta | kg | 4.00 | 0.0 | - | - |
| Monaco | | 20.00 | 0.0 | - | - |
| *Africa* | kg | 11207.0 | 8.5 | - | - |
| Guinea | kg | 11200.0 | 8.5 | - | - |

| | | | | | |
|---|---|---|---|---|---|
| Liberia | kg | 7.0 | 0.0 | - | - |
| **2524003000 Fibres, flakes, powder** | | | | | |
| **Total** | kg | **81231.0** | **35.2** | **80509533.0** | **24933.4** |
| *I. CIS countries* | kg | 70000.0 | 26.7 | 80509533.0 | 24933.4 |
| Kazakhstan | kg | - | - | 26647500.0 | 7752.4 |
| Moldova | kg | 70000.0 | 26.7 | - | - |
| The Russian Federation | kg | - | - | 53862033.0 | 17181.0 |
| *II. Other countries* | kg | 11231.0 | 8.6 | - | - |
| *Europe* | kg | 24.0 | 0.0 | - | - |
| Malta | kg | 4.0 | 0.0 | - | - |
| Monaco | | 20.0 | 0.0 | | - |
| *Africa* | kg | 11207.0 | 8.5 | - | - |
| Guinea | | 11200.0 | 8.5 | - | - |
| Liberia | kg | 7.0 | 0.0 | - | - |
| **2524008000 Other** | | | | | |
| **Total** | kg | - | - | **990000.0** | **360.5** |
| *I. CIS countries* | kg | - | - | 990000.0 | 360.5 |
| The Russian Federation | kg | - | - | 990000.0 | 360.5 |

In Ukraine, asbestos-cement production sector exists for more than 100 years[50]/ Now the asbestos-cement industry of Ukraine incorporates 12 major facilities (see Table 1.3) that produce different asbestos-containing products and consume more than 100 thousand tons of chrysotile asbestos annually.

Table 1.3

**The list of Ukrainian facilities that apply asbestos in their production operations (Ukrainian Chrysotile Association)**[51]

| # | Facility name | Location, address |
|---|---|---|
| 1. | "Ivano-Frankovsktsement" Co. | Ivano-Frankovsk oblast, Tysmenitskiy district, Yamnitsa village |
| 2. | "Volyn-Shifer" Co. | Rovno oblast, Sdolbunovbskiy district, 1 Shevchenko St. |
| 3. | "Kramatorskiy shifer" Co. | Donetsk oblast, Kramatorsk, 2 Privokzalnaya St. |
| 4. | "Tekhprom" Co. | Donetsk oblast, Amvrosievskiy district. Novo-Amvrosievsoe village, 16 12th Dekabrya St. |
| 5. | "Balakleevskiy Asbestos-cement Plant" Co. | Kharkov, 10 Biologicheskaya St. |
| 6. | "Kharkov Insulation and Asbestos-cement Materials Plant" Co. | Kharkov, 10 Biologicheskaya St. |
| 7. | "Asbestos-cement Plant" Co. | Kiev, 102 Frunze St. |
| 8. | "Kryazh" Private Company "Krasnogvardeiskiy Asbestos-cement Plant" | AR Crimea, Krasnogvardeiskiy district, Krasnogvardeisk township, 5 Polevaya St. |
| 9. | "Zaporozhskiy Asbestos-cement Plant" Co. | Zaporozhie, 36 Kakhovskaya St. |
| 10. | "Delta-Bug" Co. | Nikolaev, 62-a Mira Ave. |

[50] http://ukrchrysotile.com.ua
[51] http://ukrchrysotile.com.ua/uchasniki.html

| | | |
|---|---|---|
| 11. | "Uralasbest" Company | Odessa oblast, Iliichevsk, 4 Promyshlennaya St. |
| 12. | "Tribo" Co. (former Belotserkovskiy Technical Asbestos Items Plant) | Kiev oblast, Belaya Tserkov, 95 Levanevskogo St. |

Ukrainian asbestos-cement facilities annually produce more than three thousand products worth about UAH 600 million (or $120 million) and generate UAH 300 million ($60 million) of tax revenues.[52]

Corrugated asbestos-cement sheets represent the key product of the asbestos-cement industry. Asbestos-cement sheets are broadly used in Ukraine - about 90% of roofs are covered by them [53]. Besides these sheets, the asbestos-cement industry produces other roofing elements, asbestos-cement popes and asbestos-based technical items.

Since 2006, Ukrainian plants produced 748.0 million standard plates (71341.9 thousand $m^2$) of corrugated asbestos-cement sheets and similar asbestos-cement products, including 632.0 million standard plates (60860.1 thousand $m^2$) in 2007[54]. In 2006, Ukrainian asbestos-cement plants produced 2005 km of standard pipes (40815 tons), inc. pipes, couplings and fittings to them made of asbestos-cement, cellulose fibreboard and similar materials, while in 2007 the relevant figure reached 2006 km of standard pipes (40741 tons)[55].

Ukraine widely participate in export and import operations with asbestos-cement products with many countries of the world[56].

**It is worth to note the following exported products:**

1. Products made of asbestos-cement, cement with cellulose fibres or similar materials.

In 2006, Ukraine exported $US 25,295.72 thousand worth of these products, while in 2007 the relevant figure reached $20,607.7 thousand. The range of major importers of these products included European countries (inc. Romania as the largest importer) and CIS countries (inc. Moldova as the largest importer).

2. Corrugated asbestos-cement sheets.

In 2006, Ukraine exported $US 24,298.59 thousand worth of these products, while in 2007 the relevant figure reached $19,287.0 thousand. The range of major importers of these products included European countries (inc. Romania as the largest importer) and CIS countries (inc. Moldova as the largest importer).

**It is worth to note the following products imported to Ukraine**:

1. Products made of asbestos-cement, cement with cellulose fibres or similar materials.

In 2006, Ukraine imported $US 4,632.97 thousand worth of these products, while in 2007 the relevant figure reached $3,638.3 thousand. The range of major exporters of these products included CIS countries (inc. the Russian Federation as the largest exporter).

2. Corrugated asbestos-cement sheets.

In 2006, Ukraine imported $US 3.318,28 thousand worth of these products, while in 2007 the relevant figure reached $1,720.8 thousand. The range of major exporters of these products included CIS countries (inc. the Russian Federation as the largest exporter).

3. Processed asbestos fibres; mixtures at the base of asbestos or magnesium carbonate; products made of these mixtures or asbestos.

In 2006, Ukraine imported $US 5,043.89 thousand worth of these products, while in 2007 the relevant figure reached $6,001.5 thousand. The range of major exporters of these products included

[52] http://allcherkassy.info/archives/410
[53] www.infina.ru/ftproot/files/research/URAG.pdf
[54] Data of the State Committee of Ukraine for Statistics, 2008.
[55] Data of the State Committee of Ukraine for Statistics, 2008.
[56] Data of the State Committee of Ukraine for Statistics, 2008.

CIS countries (inc. the Russian Federation as the largest exporter) and Asian countries (inc. China as the key exporter).

4. Plates made of asbestos and elastomere (film coating).

In 2006, Ukraine imported $US 2,092.07 thousand worth of these products, while in 2007 the relevant figure reached $2,784.8 thousand. The range of major exporters of these products included CIS countries (inc. the Russian Federation as the largest exporter).

"Ivano-Frankovsktsement" Co.[57] is the only Ukrainian producer of the new generation of asbestos-free roofing sheets - so called ECO-DACH fibre-cement sheets. The new roofing material is produced from high quality cement of the facility's own production and a mixture of special fine environmentally clean fibres (polyvinyl acetate) as a reinforcing material. As result, finished roofing plates display high physical and mechanical performance and meet EN 494 European requirements.

The first line for production of fibre-cement roofing plates and associated sealing items was launched in 2003.

ECO-DACH fibre-cement roofing plates were certified in Ukraine and by laboratories the European Union member-states, accredited by the International Standardisation Organisation (ISO) - as a result these plates may be exported to all EU countries[58].

ECO-DACH fibre-cement roofing plates provide all benefits of traditional materials, utilise modern state-of-the-art technologies, but in addition these plates are environment friendly and safe for human health.

Visually, fibre-cement roofing plates look like traditional asbestos-cement plates but as specialists say, it is the only similar property. Long service life of asbestos-free roofing plates is a substantial advantage - these plates may serve for at least 50 years. Traditional types of asbestos-cement plates have a low impact resistance - the material is fragile. Fibre-cement plates are tough, resistant to load, impacts, deformation, moisture and sharp changes of temperature, they provide a better noise insulation performance, resistant to sunlight and biological factors.

Asbestos-free roofing plates have lower density comparatively to traditional ones. According to the State Construction Standards, weight of an asbestos-cement roofing sheet cannot exceed 26 kg. A fibre-cement plate of the same dimensions weights 21.5 - 22 kg.

In contrast to asbestos-cement plates, fibre-cement plates may be produced in a broader colour range (red, vinous, green and brown)[59].

"Ukrainian Roofs" Co. was founded by "Ivano-Frankovsk-eternit" Co. in late 2007[60]. The company operates two production lines for production of fibre-cement roofing plates: one production line is used for production of SE type plates (European shape), while the second one produces SV type plates (traditional shape).

From March to May 2008, "Ukrainian Roofs" Co. produced more than 1 million $m^2$ of fibre-cement roofing plates.

**The problem of management of asbestos-containing waste**

The problem of management of asbestos-containing waste is fairly serious for Ukraine and all other countries of EECCA region.

In the majority of cases asbestos-containing wastes are represented by waste construction materials that are not considered as hazardous waste and are disposed off as solid municipal waste (landfilling). Besides that, asbestos-containing waste is generated by industrial operations.

[57] http://www.ukrbiz.net/62484/pr/rus/67861/?pr_search[id]=67861
[58] http://www.ukrbiz.net/62484/pr/rus/67861/?pr_search[id]=67861
[59] http://www.ifcem.if.ua/indexua_news.html
[60] http://www.ukrbiz.net/rus/pr/68756/

Table 1.4 contains information on main sources of releases of asbestos-containing (inc. dust, powder and fibres), understandard or damages asbestos-cement roofing sheets of I to III hazard grades in 2006 - 2007[61].

Table 1.4

**Main sources of releases of asbestos-containing waste in 2006 - 2007.**

| | 2006 | | | 2007 | | |
|---|---|---|---|---|---|---|
| | Actual facilities' on-site waste generation | | Waste supplied by other facilities (tons) | Actual facilities' on-site waste generation | | Waste supplied by other facilities (tons) |
| | tons | in % vs. 2005 | | tons | in % vs. 2006 | |
| **All types of economic activities** | **899.510** | **828.7** | **3.790** | **1 367.441** | **152.0** | **0.140** |
| **Agriculture, hunting and forestry** | 0.040 | 60.6 | - | 0.070 | 175.0 | - |
| **Mining industries** | 0.913 | 52.8 | - | 0.628 | 68.8 | - |
| Extraction of hydrocarbons | 0.258 | 151.8 | - | 0.148 | 57.4 | - |
| Extraction of metal ores | 0.400 | 30.5 | - | 0.480 | 120.0 | - |
| **Processing industries** | 855.622 | 1091.2 | 0.090 | 1 306.378 | 152.7 | 0.140 |
| Food industry | 10.508 | 99.8 | - | 0.161 | 1.5 | - |
| Production of coke, oil refineries and nuclear fuel | 4.464 | 110.0 | - | 3.112 | 69.7 | - |
| Chemical industry | 1.218 | 153.3 | - | 1.325 | 108.8 | - |
| Production of asbestos-cement and fibre-cement products | 158.000 | - | - | 480.000 | 303.8 | |
| Production of other non-metal mineral products | 621.765 | 3730.7 | - | 811.406 | 130.5 | - |
| Metallurgy | 6.466 | 62.9 | - | 8.581 | 134.3 | - |
| Manufacture of transportation vehicles and equipment | 52.410 | 189.1 | - | 0.847 | 1.6 | - |
| Production and distribution of electric power, gas and water | 37.471 | 155.1 | - | 52.325 | 139.6 | - |
| **Construction** | 0.082 | 186.4 | - | 0.463 | 564.6 | - |
| **Transport and communications** | 5.300 | 144.1 | - | 7.495 | 141.4 | - |
| **Real estate operations, rent and provision of services to legal entities** | - | - | 3.700 | - | - | - |

In 2006, due to consideration of additional types of waste, the inventory results of 2006 (besides asbestos-containing dust, powder and fibres) also included 18.769 tons of understandard or damaged asbestos-cement sheets (I to III hazard grades).

[61] Data of the State Committee of Ukraine for Statistics, 2008.

The overall generation of asbestos-containing waste (inc. asbestos-containing dust, powder, fibres and understandard or damaged asbestos-cement sheets (I to III hazard grades) reached **918.279** tons in 2006 and **1,367.441** tons in 2007.

The key sources of asbestos-containing waste are located in Kiev oblast (Belaya Tserkov) and in Kiev (87 % and 95 % of waste generation in 2006 and 2007, respectively). Asbestos-containing waste including asbestos-containing dust, powder, fibres and understandard or damaged asbestos-cement sheets of I to III hazard grades should be reused, neutralised or stored.

Reuse of asbestos-containing wastes is predominantly limited to their transfer to other facilities. Only a tiny fraction of these wastes (0.43 % in 2007) are neutralised/eliminated, mainly by incineration.

Asbestos-containing wastes are stored at specially allocated sites, including municipal solid waste landfills, at unequipped dumps outside facilities or on facilities' sites.

Asbestos air emissions from production or technological processes pose a serious threat to human health and the environment. See Table 1.5 for information on asbestos air emissions in 2007[62].

Table 1.5

**Asbestos air emissions from all production/technological processes and installations (equipment) in 2007**

| | The number of emitting facilities | | Emissions | | | Percentage distribution of emissions |
|---|---|---|---|---|---|---|
| | The number of emitting facilities | in % vs. 2006 | tons | in % vs. 2006 | Increase/decrease (-) comparatively to 2006. | |
| **Ukraine** | **31** | **91.2** | **28.196** | **100.8** | **0.229** | **100** |
| Dnepropetrovsk oblast | 2 | 100 | 0.044 | 88 | -0.006 | 0.2 |
| Donetsk oblast | 3 | 75 | 12.083 | 98.5 | -0.181 | 42.8 |
| Zakarpatskaya oblast | - | - | - | - | -3.54 | - |
| Zaporozhie oblast | 3 | 100 | 0.192 | 62.5 | -0.115 | 0.7 |
| Ivano-Frankovsk oblast | 1 | 100 | 0.009 | 128.6 | 0.002 | - |
| Kiev oblast | 2 | 200 | 7.333 | 288.6 | 4.792 | 26 |
| Nikolaev oblast | 1 | - | 0.001 | - | 0.001 | - |
| Odessa oblast | 1 | 100 | 0.003 | 100 | - | - |
| Poltava oblast | 2 | 100 | 0.232 | 51 | -0.223 | 0.8 |
| Rovno oblast | 1 | 100 | 1.775 | 117.8 | 0.268 | 6.3 |
| Kharkov oblast | 6 | 85.7 | 5.349 | 94.8 | -0.292 | 19 |
| Khmelnitskiy oblast | 1 | 100 | 0.001 | 100 | - | - |
| Cherkassy oblast | 1 | 100 | 0.025 | 104.2 | 0.001 | 0.1 |
| Chernovtsy oblast | - | - | - | - | -0.463 | - |
| Kiev | 6 | 120 | 1.144 | 98.9 | -0.013 | 4.1 |
| Sevastopol | 1 | 50 | 0.005 | 71.4 | -0.002 | - |

[62] Data of the State Committee of Ukraine for Statistics, 2008.

## KAZAKHSTAN

"Kustanaiasbest" plant is located in the Northern Kazakhstan, in Zauralskiy mineral region with its famous iron, aluminium, asbestos, gold and zinc deposits. The plant exploits Dzetygarinskiy deposit - the fifth largest global deposit of chrysotile asbestos. The plant is one of 4 asbestos-producing facilities of EECCA region and the only such plant in Central Asia.

Main production lines of the plant were constructed and commissioned in the period from 1965 to 1974. In September 1993, the plant was transformed into a JS company which was jointly state-owned and privately owned one. In 1997, the company declared a tender to sell its state share holding. "Aina Company" (Kazakhstan) won the tender and became the majority shareholder of the company. In 2000, the latter company transferred its property rights to "Pole Co." (Kazakhstan, Almaty), that how owns 88 % of shares of "DAGOK Kustanaiasbest" Co. and controls the plant.

Initial asbestos reserves of the deposit reached 1074 million tons. By late 1992, 32.5 % of asbestos reserves were removed and residual reserves reached 724.9 million tons. In late 1992, asbestos reserves were re-estimated accounting for asbestos contents of 3.88% - the new estimate suggested reserves of 705.3 million tons. By late 2000, residual asbestos reserves in the deposit were estimated to reach 684 million tons.

Provided contemporary extraction rates (about 3 million tons/year), these reserves might be sufficient to ensure 228 years of operation of the plant, however, should the plant reach its full estimated capacity of (10 million tons of raw asbestos/year), the latter figure will decrease to about 70 years.

In 4 recent years, average asbestos contents in asbestos ore varied from 4.82 % to 5.74 %, at the average content of 5.16 %, or about a third higher than the average content that was used in 1992 to re-estimate the asbestos reserves of the deposit.

These facts suggest some substantial impoverishment of asbestos reserves, so it is rather likely that the next future re-estimate will give a much lower figure (with corresponding reduction of the estimated life-span of the deposit). However, even in the case of gradual increase of asbestos production there and stricter requirements, the plant expected life-span would exceed 50 years.

In early 1990, due to decreasing asbestos demand, asbestos production output of the plant was reduced and some part of its production equipment was mothballed. From that time, "Kustanaiasbest" continued to operate, albeit with reduction of asbestos extraction by 1994 (to 2.8 million tons) and then, after some increase in 1995 - 1997 (to 3 - 3.2 million tons of asbestos ore), with reduction to 2.1 million tons in 1999. Growing demand for the company's products in 2000, allowed the company to increase asbestos extraction to 3 million tons.

Now, "Kustanai Minerals" Co. produces annually more than 200 thousand tons of chrysotile asbestos - about 90 % of the asbestos production is exported while the rest (10 %) goes to the domestic market.

"DAGOK Kustanaiasbest" Co. incorporates 5 main structural units. All of them face the problem of heavy depreciation of fixed assets, accounting for standard requirements to service life. Depreciation rates of fixed assets vary from 13 to 90 %. Buildings and constructions have lower depreciation rates (13 – 30 %), while equipment and machinery have average depreciation rates of 65 – 80 %.

Mainstream products of "DAGOK Kustanaiasbest" Co. include chrysotile asbestos of 4 different groups and 15 brands. Brands are defined by contents of asbestos of a certain grade. A grade code number is defined by the prevailing length of asbestos fibres. Long-fibre asbestos is categorised into groups with lower group code numbers (from group 0), while short-fibre asbestos is categorised

into groups 6 and 7. A group number is the key factor of a product price, as long-fibre asbestos is generally more expensive.

In monetary terms, other company products represent only 2 %of its output, including mainly 7th group asbestos; crushed stone and fine grained mineral chippings for ruberoid production.

Products of "DAGOK Kustanaiasbest" Co. are mainly used for production of asbestos-cement pipes and roofing plates. Besides that, a some part of it is used for production of sealing items and water-proof materials. The company does not produce asbestos of 1st and 2nd groups and textile-grade asbestos (group 0), as asbestos of such quality is not present in ores of Dzetygarinskiy deposit.

**Structure of asbestos export**

Notwithstanding that Kazakhstan has an asbestos mining facility of its own, application of asbestos in the country is rather low and "DAGOK Kustanaiasbest" Co. predominantly orients on export operations. The share of exports in recent years varied from 81 % (1997) to 98 % (2000). The company belongs to largest asbestos suppliers to the global market. In 2000, the company exported 9 % of all international supply of chrysotile asbestos (according to the company data).

According to demand in asbestos of 3rd to 6th groups, in 2001, supply of "DAGOK Kustanaiasbest" Co. to different countries distributed as follows:

| **Supply of asbestos of 3rd to 6th grade (tons)** | | |
|---|---|---|
| Regions | **2000** | **2001** |
| Kazakhstan | 10925 | 14747 |
| Russia | 30999 | 27625 |
| Belarus | 0 | 1588 |
| Ukraine | 18290 | 49228 |
| Moldova | 1095 | 0 |
| Uzbekistan | 33945,2 | 16979 |
| Turkmenistan | 1425 | 1989 |
| Kyrgyzstan | 7083,1 | 11665 |
| Azerbaijan | 1301 | 2478 |
| Tajikistan | 450 | 0 |
| Latvia | 660 | 525 |
| Iran | 13160 | 13223 |
| India | 14517 | 18057 |
| Vietnam | 17742 | 5908 |
| China | 4027 | 6387 |
| Turkey | 16976 | 20925 |
| Thailand | 0 | 6287 |
| Spain | 0 | 604.5 |
| US | 0 | 270 |
| The Czech Republic | 0 | 67 |
| Philippines | 0 | 6.5 |
| Portugal | 756,5 | 0 |
| Syria | 85 | 2026 |

| | | |
|---|---|---|
| **Total** | **173437** | **200584** |

## KYRGYZSTAN

### Non-metallic mineral resources of Kyrgyzstan

The Republic of Kyrgyzstan has vast resources of non-metallic mineral resources[63]. In terms of origin, technical properties and spheres of application they may be subdivided into: *construction materials, mineral and chemical production inputs, agro-ores, semiprecious stones, etc.* Many of them fall into several groups, suggesting multiple practical applications.

Refractory and moulding materials are used in metallurgy, such as serpentine, magnetite, graphite, quartz, chamotte, dolomite etc. At the territory of the Republic of Kyrgyzstan only one serpentine deposit was explored - Kanskoye deposit - and its mineral resources were estimated.

Quartz sand of Koltso-Polovinka deposits may be used for moulding purposes. Natural graphite is often encountered in Talass and Kungeu Ala-too, Sary-Khazskiy ridge. High grade graphite of Keelyu deposit is of high industrial value.

Fluorite minerals are common in Aikarkenskiy and Chayvaiskiy Sb-Hg deposits, Abshyrskiy and Severo-Ak-Taskskiy Sb deposits and others. The range of natural fillers, thermal and electric insulation materials includes mica, talc, asbestos, pyrophyllite, kaolin, bergmeal, mineral pigments. Mica-bearing rock is found in Talasskiy, Turkestanskiy, At-Bashinskiy and Teskeiskiy ridges.

Minor manifestations of asbestos are found in ultrabasic rock at the Northern slope of Altaiskiy ridge, in Talasskiy, Kyrgyzskiy, Kungey and Teskey Ala-Too, in Chon-Kemin river basin. Talc and pyrophyllite manifestations are rare and poorly explored. Industrial grade reserves of talc were found in Shamal-Tal-Kazy deposit. Talc manifestations in Kulagan-Tash seems to be prospective.

Some types of mineral deposits at the territory of Kyrgyzstan are rarely found in other regions of the World[64], these deposits contain: wollastonite (Kara-Korum II deposit in Chotkalskiy district with reserves of about 30 million tons), rodusite asbestos (Karkara, 618 tons), basalt (Sulu-Tegerek, 1.4 million $m^3$) and others.

Raw and processed non-metallic mineral resources are of major importance for socio-economic development and Kyrgyzstan. They are broadly used in civil and industrial construction, agriculture, industry, jewellery, etc.

Since 1980s, extraction of non-metallic mineral resources for production of construction materials has been developing gradually, fully meeting demand of construction industry of Kyrgyzstan.

Now, the construction materials industry in Kyrgyzstan produces cement, roofing plates, other asbestos-cement items, ceramics, plaster, facing stones, etc. Some products are exported to neighbouring countries, inc. cement (about 0.5 million tons annually), bricks, etc. Two stone-processing facilities were commissioned in Tokmok and Ivanovka township - annually they produce up to 100 thousand $m^2$ of facing tiles and cut stone.

"Ciments de Lux S.A." Co. that hold the majority shareholding of Kantskiy Cement-Board with annual production capacity of more than 1 million tons of cement and 1.6 thousand standard asbestos-cement pipes, has completed reconstruction of the plant to improve quality of its products and expand its production capacity.

**"Kantskiy Cement-Board" Co.**[65]

[63] http://www.welcome.kg/ru/kyrgyzstan/nature/pl2/161.html
[64] http://www.kgs.bishkek.gov.kg/geology_rus.htm
[65] http://slateplant.narod.ru/about1.htm

The plant was commissioned in 1964. The plant is located in Chuiskiy valley, at the distance of 22 km to the North-east from Bishkek - he capital of Kyrgyzstan. The plant produces Portland cement, asbestos-cement roofing sheets and asbestos-cement pipes (120, 200, 300, 400 mm in diameter).

Due to high quality and low prices of its products, Kantskiy Cement Plant successfully competes at the market of Central Asia with producers of Uzbekistan, Kazakhstan, Azerbaijan and Russia.

**Estimated production capacity of "Kantskiy Cement-Board Plant"**

| Products | Units o measure | Production capacity |
|---|---|---|
| Clinker | thousand tons/year | 1,088,000 |
| Cement | thousand tons/year | 1,290,000 |
| Roofing plates | million standard plates/year | 180,000,000 |
| Asbestos-cement pipes | million standard pipes/year | 2,070,000 |

The range of asbestos-cement products of the plant includes asbestos-cement pipes of high and low operating pressure and corrugated asbestos-cement plates (board).
The contemporary quality of production equipment of Kantskiy Cement-Board Plant allows the facility to produce annually, at relatively low production costs: up to 750 thousand tons of cement; up to 600 - 700 km of standard asbestos-cement pipes; 160 million standard plates of asbestos-cement board. Production costs are the lowest in the region, while quality of products is rather high.

Kantskiy Cement-Board Plant traditionally supplies its products to Uzbekistan, Turkmenistan, Tajikistan, Kazakhstan, Caucasian countries, Russia, China and Afghanistan.

Depreciation rates of fixed assets of the plant reach 40 – 70 %, resulting in growing maintenance and operation costs. In order to maintain the plant in operation, it is necessary to invest directly $4-5 million annually.

According to official data, every year, residential housing construction in Kyrgyzstan increases by about 20%. It is clear, that at the background of so intensive construction development, the country has to face some shortages of different construction materials periodically. According to Adal Isabekov[66], the Director General of Kantskiy Cement-Board Plant Co., these shortages are difficult for him to explain as the company produces a half of all construction materials in the country and pays as taxes up to 200 million soms annually or $5 million 263157.89.

The situation of Kantskiy Cement-Board Plant Co. is really strange. The plant annually produces about 1 million tons of cement. The domestic demand in cement reaches only 50 % of the amount. Every year, the company supplies to domestic market more than 500 thousand tons of cement i.e. more than necessary. However, many critics, including MPs, periodically blame the company for its marketing strategy that allegedly fails to account for interests of the country's residents, depriving them of sufficient supply of cheap cement and roofing plates. For example, the company sells its M-400 grade cement at wholesale price of $45/ton. In Kazakhstan, where construction industry develops with similar intensity as in Kyrgyzstan, the price reaches $120 per ton of the same grade cement. One can easily calculate how profitable cement resale operations might be. The same is true for asbestos-cement boards, and the company sells 60% of its products to Kyrgyz wholesale companies, that may resale them at their own discretion. Contemporary wholesale prices directly stimulate illegal export of products to neighbouring countries.

In Kyrgyzstan, cement and asbestos-cement board prices are the lowest in the whole EECCA region. The company is a legal natural monopoly in the country and according to the relevant legislative acts of the Republic of Kyrgyzstan, its pricing policies are subject to mandatory state control.

[66] http://www.tazar.kg/news.php?i=1404

**"Kantskiy Cement-Board Plant" establishes its daughter company - "Kant KSP" (Kyrgyzstan)**[67]

"Kantskiy Cement-Board Plant" Co. in Kyrgyzstan was renamed into "Kantskiy Cement Plant" with further state re-registration. The decision was made by the extraordinary meeting of the company shareholders on October 19, 2007. According to experts of BNC Finance investment company, the decision was made in connection with cancellation of production of asbestos-cement pipes and roofing plates.

## Chapter 2

## HEALTH IMPACTS OF ASBESTOS

Asbestos health impacts are associated with inhalation of asbestos fibres with contaminated air in occupational environments, or nearby emission sources, or indoors (in a room asbestos-containing fragile materials). Highest levels of asbestos exposure are associated with such operation as handling asbestos in containers, mixing it with other materials and dry cutting of asbestos-containing items with machine tools. Besides that, asbestos exposure may be associated with installation and maintenance of asbestos-containing car parts. All asbestos-containing materials (inc. chrysotile and amphibole asbestos) are still present in many buildings and can generate health impacts in the course of their use, reconstruction, removal or demolition.

Now, occupational asbestos exposure threatens health of about 125 million people. Global assessments suggest that at least 100 thousand people die annually from ***lung cancer, mesotheliomas and asbestosis***, induced by occupational asbestos exposure. Besides that, experts assume that several thousands of deaths may be attributed to other asbestos-induced diseases and non-occupational asbestos exposures. The burden of asbestos-induced morbidity continues to grow even in countries that had banned asbestos use in early 1990s. Asbestos-induced diseases have long latency periods, as a result, any reduction of asbestos application now would result in reduction of asbestos-related mortality only a few decades later.

Incidence of asbestos-induced diseases depends on type and length of asbestos fibres, doses and previous industrial asbestos-processing operations. No threshold was identified for carcinogenic effects of chrysotile asbestos. Smoking increases asbestos-induced risks of lung cancer.

Asbestos (all forms.) was classified by IARC[68,69] as a 1st group human carcinogen. Asbestos may act as a cancer inductor and a cancer promoter. Asbestos is a carcinogen itself and may promote carcinogenic effects of other factors.

Mechanisms of asbestos carcinogen effects may be associated with formation of active oxygen forms in target organs, as these active forms are known to damage cellular membranes and genetic structures. High iron levels in amphibole asbestos result in reduction of oxygen to superoxide, hydrogen peroxide and eventually to hydroxide radical. Besides that, active oxygen forms are generated when phagocytes are damaged by "long" asbestos fibres (length over 10 μm).

Published sources also suggest that short asbestos fibres (under 10 μm in length) may directly damage chromosomes and other cellular structures.

Now, cancer pathology is considered as a multi-factor process[70]. It is associated with some inherited predisposition that might result in development of a disease under impact of carcinogenic (mainly mutagenic) environmental factors.

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[67] http://www.ma-journal.ru/news/40297/
[68] Asbestos- IARC , 1973. - Vol.2.
[69] Asbestos- IARC , 1977. - Vol.14.
[70] Carcinogenesis /D.G.Zaridze ed.. - M., 2005. (Rus.)

Development of a malignant tumour is initially induced by formation of a cell with damaged genetic structures - the cell may be either destroyed or start to divide, forming a malignant tumour. For safety reasons, cancinogens (inc. asbestos) are generally assessed using "no threshold" conservative models. In the case of mammals, evolutionary developed multi-level counter-mutagen systems prevent cellular genetic damage and eliminate damaged cells.

Accounting for the above factors, one may conclude that in the case of each adverse impact, there is some individual impact threshold, that, if exceeded, results in some damage. However, if we take a large population group, the threshold becomes senseless, as the large group will always include an individual (e.g. affected by diseases, with suppressed immune system, etc.), who will be adversely affected by a factor even at lowest intensities/concentration. A human society agrees on a socially acceptable risk of impact of a particular factor (accounting for economic, political, ethical considerations) and seeks to limit its impacts on professional groups and the general population to the agreed limits.

Asbestos impacts are considered as an example of a threshold-associated carcinogenic process, as there is abundant evidence that asbestos-induced cancer develops after development of asbestosis. Such specifics make it easier to establish a causal link between asbestos exposure and development of a tumour. But there is no biological justification for inferring that asbestosis is a necessary precondition for cancer from asbestos. Most of the early reports on lung cancer were selected from asbestosis cases - but this only shows that the risk was great among workers with so much exposure that they had asbestosis. It left unanswered the question of risk for less exposed workers (and non-workers). Sure, some mesothelioma victims have had asbestosis, but with such a long latent disease, they had to survive 30 years or more after starting to work with asbestos. And many mesothelioma victims did not have asbestosis. Certainly from the standpoint of assessing occupational disease compensation, it is easier to do when the worker with lung cancer also has other signs like pleural changes and asbestosis; but such cases can also be decided on the basis of occupational history and tissue burden of asbestos. In experimental studies in which rats inhaled asbestos dust, mesotheliomas and metastatic lung cancer occurred in animals who were exposed for as little as one 7-hour day. No such tumors occurred in unexposed rats[71]. Mesotheliomas have always been recognized as occurring in people without asbestos, including household members of asbestos workers and neighbors of asbestos factories[72].

According to the WHO Working Group[73] (1986), in the case of the general population (without occupational asbestos exposures) it seems impossible to make reliable estimates of asbestos-induced lung cancer or mesothelioma risks.

In more recent recommendations on air quality, WHO experts[74] (2004) supported the above conclusions, referring to risk assessments, made by extrapolation of risks of occupational asbestos exposure to the general population.

However, they admitted that data of occupational exposure were extrapolated to low concentrations of non-occupational exposure with multiple uncertainties.

Such extrapolation uncertainties were associated with lack of reliable epidemiological data, data errors and simplifications in the extrapolation model. Moreover, development of malignant tumours has a long latency period after the initial impact, while asbestos levels in air may be in the past years may be assessed only with a substantial uncertainty.

Epidemiological data suggest the following life-long risks of asbestos-induced mesothelioma: $1.0 \times 10^{-4}$ for 1000 fibres/$m^3$; $1.0 \times 10^{-4}$ for 130-800 fibres/$m^3$; $1.56 \times 10^{-4}$ for 400 fibres/$m^3$. WHO

[71] Wagner et al. Br J Cancer 29: 252-269, 1974
[72] Newhouse and Thompson, Br J Ind Med 222: 261-269, 1965
[73] Asbestos and others natural mineral fibres. Geneva. WHO, 1986.
[74] Recommendations on air quality in Europe. 2nd edition. WHO. M.: 2004. (Rus.)

experts[75] assess these risks as 1.0 - 3.9 x $10^{-5}$ for 100 fibres/$m^3$, however, the average figure 2.0 x $10^{-5}$ for 100 fibres/$m^3$ is considered as the most adequate estimate.

Mesothelioma incidence for the general population is estimated as the number of registered cases minus the number of cases assumed to be of occupational nature. Both numbers are considered as unreliable indicators due to associated diagnosis and registration difficulties. Moreover, contribution of other adverse environmental factors into mesothelioma incidence is largely unknown. Mesothelioma cases were registered after occupational exposures to crocodilite, tremolite and chrysotile, as well as among residents living nearby asbestos plants and mines, and among relatives of people with occupational exposure to asbestos.

Lung cancer cases are much more common among the general population than mesothelioma. Exposure to chrysotile and crocodilite-containing composite materials increases lung cancer risks.

Besides that, lung cancer is induced by numerous factors, including smoking as the most obvious one. As a result, epidemiological research and analysis of correlations between lung cancer risks and asbestos exposures are even more complicated than in the case of mesothelioma. No one has any idea how many smokers in the general population die from lung cancer who would not develop cancer but for their additional environmental asbestos exposure.

## RUSSIA

Asbestos is particularly hazardous if inhaled as dust. In international practice, maximal allowed concentrations (MACs) for asbestos in air are set in so called "inhalable fibres" (fibres of certain length and diameter) per 1 $cm^3$. In Russia, the MAC is set at the level of 0.06 fibre/$cm^3$, or about the same as in Canada. However, Russian specialists argue that a more adequate MAC could be expressed in concentrations of asbestos-containing dust in ambient air (similarly to all other pollutants). In the latter case all types of asbestos fibres could be taken into account (instead of the most hazardous ones) and asbestos toxicity could be directly compared with other substances.

Bazhenovskoye asbestos deposit - the largest in the World - was operational for more than 110 years. The deposit is located nearby Asbest town in Sverdlovsk oblast. **The town became a symbol of "asbestos plague".** Some call it a ghost town or dying town. From 1947 and up to 1970s lung cancer mortality in Asbest exceeded relevant average figures for Sverdlovsk oblast in 2 - 3 times (it is worth to note that there are many industrial facilities in the oblast - sources of carcinogenic emissions). Moreover, in the case of workers of asbestos plants, cancer mortality and morbidity were several times higher comparatively to local residents without occupational exposures to asbestos.

The situation somehow improved in recent years. Old factories were decommissioned and new ones were constructed with modern equipment and pollution control systems. Almost all production operations in open cast mines were mechanised. While in 1950-60s, dust levels in indoor air of production buildings reached tens or even hundreds mg/$m^3$, in 1990s these levels decreased to 2 - 6 mg/$m^3$. In the town, levels of asbestos dust in outdoor air decreased by one thousand times and are now 0.01 - 0.03 mg/$m^3$.

However, rates of chronic occupation morbidity in Sverdlovsk oblast in recent years demonstrate a clear raising trend (5.01 cases per 10,000 workers in 2004 vs. 2.94 in 2000). Moreover, respiratory diseases clearly lead among all newly registered pathologies (71.6 % in 2004).[76] According to statistical data, ***pneumoconiosis*** (including asbestosis as a form of pneumoconiosis) is the most common occupational lung disease (64%). In the majority of cases, occupational diseases were

[75] Monitoring of ambient air quality for assessment of health impacts. Regional WHO publications. European series, # 85, WHO, 2001. (Rus.)
[76] http://ovpso.ru/download/klpukpylevayapatolog.doc

registered among workers who had occupational exposure for 15 years and longer.[77] Occupational diseases were registered in 32 municipalities of Sverdlovsk oblast, including Asbest.

Risks of development of dust-induced lung diseases are proportional to mass of inhaled dust. Hard physical loads and unhealthy climate conditions cause additional pressure on workers' cardiovascular system and aggravate adverse effect of the dust.

Late identification of occupational nature of a disease results in longer exposures to adverse occupational factors, aggravation of the disease, development of complications and loss of professional and general labour capacity.

Diagnosis of dust-induced lung diseases is difficult due to lack of specific clinical manifestations. These diseases generally are not diagnosed at their early stages, when it is possible to ensure real medical and social rehabilitation and to preserve a patient's labour capacity by avoiding contacts with the exposure agent. This may apply for asbsestosis but not occupational cancer.

Now, in Sverdlovsk oblast, occupational respiratory diseases are generally diagnosed at the stage when they are severe.

There are only a few published studies on mesothelioma incidence in different regions of Russia. The majority of publications on mesothelioma treatment refer only to works of foreign authors. So far, it is generally claimed, though not necessarily believed, that incidence of such malignant tumours at the territory of Russia are extremely rare[78].

According to A.I. Shteintsang, in Russian sources published up to 1972, 175 mesothelioma cases were reported[79].
L.K.Bogush reports on 19 patients with pleural mesothelioma, who underwent medical treatment in Moscow TB Clinic No. 7 from 1969 to 1975[80].
L.K. Kheitova reported 11 mesothelioma cases for 7184 post mortem examinations, according to reports of Tambov oblast Anatomical Pathology Office for 10 years (1978 - 1987)[81].
A.A.Sadovnikov reported 3 cases of malignant pleural mesothelioma in Kostroma oblast TB Clinic from 1991 to 1997[82].
O.V. Bezrukova in 1995 reported 42 cases of pleural mesothelioma among patients in Altai Krai Oncological Clinic in 2 years (1993 - 1994)[83].
N.I. Saipova presented case history of one patient with pericardium mesothelioma who underwent treatment in Nizhniy Novgorod oblast Clinical Hospital in 1999[84].
Yu.S. Landashev in 1999 described 2 cases of primary pericardium mesothelioma diagnosed in the Cardiology Section of Amur oblast Clinical Hospital in different years with time difference of 12 years[85].
N.A. Terentieva reported 15 cases of registration of pleural mesothelioma for 7 years (1993 - 2000) in Nizhniy Novgorod Oncological Clinic[86].

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[77] http://sverdlov.lawsector.ru/data/norm13/stran7.htm
[78] *Grinberg L.M., Kashanskiy S.V., Berdnikov R.B. et al.* Mesothelioma incidence in Sverdlovsk oblast // Proceedings of Russian Theoretical and Practical Conference of Oncologists with International Participation. Barnaul, 2006. p. 269-270. (Rus.)
[79] *Shteintsang A.H.* TB-associated pleural mesothelioma // Oncology issues. 1972. v. 18, # 2. p. 73-77. (Rus.)
[80] *Bogush L.K., Zharkovich I.A.,Kubrik N.E. et al.* About pleural mesothelioma // Oncology issues. 1975. v. XXI, # 7. p. 3-8. (Rus.)
[81] *Kheitova L.K. Once again about mesotheliomas* // Pathology archive. 1989. v. 51, # 8. p. 62-65. (Rus.)
[82] *Sadovnikov A.A., Panchenko K.I.* Pleural mesothelioma // Chest and cardiovascular surgery. 1998. # 4. p. 48-54. (Rus.)
[83] *Bezrukova O.V.,Kuzmina V.N.*. On X-ray diagnostics of pleural mesothelioma // Proceedings of II Scientific Conference in Commemoration of 100 Years of X-rays Discovery. X-ray Diagnostics Issues. Barnaul 1995. p. 7-10.(Rus.)
[84] *Ilicheva S.A.* Epidemiology of malignant tumours in printing industry: Summary thesis of a Candidate of Sciences (Medicine). M., 1998. 143 p. (Rus.)
[85] *Landashev Yu.S., Sivyakova O,N., Grigorenko A.A.*. Primary heart malignant tumours // Far East Medical Journal. 1999. p. 18-20. (Rus.)

The above publications report cases of mesothelioma diagnostics or treatment in major clinics and do not provide assessments of mesothelioma incidence in specific regions. However, it is with to note fairly regular publications on this type of tumours in the USSR in different periods of time and a rather broad geographic distribution of the reported cases.

The real scale of mesothelioma morbidity in Russia is unknown[87]. In the 20th century, only 4 epidemiological studies of mesothelioma were conducted: local studies in Asbest and Yekaterinburg, regional studies in the Republic of Karelia and a pilot study in Sverdlovsk oblast[88,89].

In Sverdlovsk oblast, in 25 years (from 1981 to 2005), 125 mesothelioma cases were identified, the standard morbidity indicator for the oblast (u1087) was found to reach 1.1 cases per 1 million residents[90].

In St. Peterburg, in 5 years (1993 - 1997) 21 mesothelioma cases were registered, the standard morbidity indicator for men reached 0.2 per 100 thousand residents (2 cases per 1 million), while the indicator for women reached 0.1 per 100 thousand residents (1 case per 1 million)[91].

In 1984, at the territory of the former USSR, 2.3 million tons of asbestos were produced, i.e. more than a half of the global production (for comparison, in the same time, the USA produced 57.5 thousand tons. Accounting for the above fact, one can definitely expect some growth of mesothelioma morbidity in Russia[92,93].

The average period of time between the initial asbestos exposure and identification of the disease symptoms reaches 30 - 40 years[94], as a result, incidence of asbestos-induced diseases (inc. mesothelioma) in countries of the former USSR may peak in 2010 - 2020. The latency period may be shorter - up to 5 years [95,96].

It is worth to note that, according to some Russian specialists, contacts with asbestos-cement items may also pose some health hazards. For example, Prof. Pylev L.N. (Blokhin Institute of Carcinogenesis of the Russian Academy of Medical Sciences) argued that cutting or drilling of asbestos-cement plates may result in inhalation of asbestos dust by a worker.

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[86] *Terentieva N.A., Novikova M.Yu, Gurdzhi M.Ya. et al* Malignant pleural mesothelioma: diagnostics difficulties //Nizhniy Novgorod Medical Journal. 2001. # 4. p. 42-49. (Rus.)

[87] *Grinberg L.M., Kashanskiy S.V., Berdnikov R.B. et al.* Mesothelioma incidence in Sverdlovsk oblast // Proceedings of Russian Theoretical and Practical Conference of Oncologists with International Participation. Barnaul, 2006. S. 269-270. (Rus.).

[88] *Grinberg L.M., Kashanskiy S.V., Berdnikov R.B. et al.* Mesothelioma incidence in Sverdlovsk oblast // Proceedings of Russian Theoretical and Practical Conference of Oncologists with International Participation. Barnaul, 2006. S. 269-270. (Rus.).

[89] *Tomilova N.E., Berzin S.A.* Mesothelioma epidemiology in Sverdlovsk oblast // Proceedings of V Russian Meeting of Oncologists. Kazan, 2000. p. 89-92. 9Rus.)

[90] *Grinberg L.M., Kashanskiy S.V., Berdnikov R.B. et al.* Mesothelioma incidence in Sverdlovsk oblast // Proceedings of Russian Theoretical and Practical Conference of Oncologists with International Participation. Barnaul, 2006. S. 269-270. (Rus.).

[91] *Parkin D.M., Whelan S.L., Ferlay J. et al.* Cancer Incidence in Five Continents. IARC Press, Lyon, 2002. Vol. 8 P. 456-468.

[92] *Bychkov M.B., Shamilov A.K., Ivanova F.G. et al.* Pleural and peritoneum mesothelioma // Russian Oncologic Journal. 1997. # 4.p. 48-51. (Rus.)

[93] *Vasilieva L.A.,Pylev L.N., Pivovarova L.N. et al.* Conservative treatment of patients with pleural and peritoneum mesothelioma: Summary thesis of a Candidate of Sciences (Medicine). M., 1997. 136 p.(Rus.)

[94] *Aisner J., Wiernik P.N.* Malignant mesothelioma current status and future prospects // Chest. 1978. Vol. 74. P. 438-444.

[95] *Bychkov M.B., Shamilov A.K., Ivanova F.G. et al.* Pleural and peritoneum mesothelioma // Russian Oncologic Journal. 1997. # 4.p. 48-51. (Rus.).

[96] *Nepomnyastchaya E..M., Bosenko S.G.* Malignant pleural mesotheliomas // Pulmanology. 2001. # 4. p.48-53. (Rus.)

## MESOTHELIOMA IN RUSSIA: A SYSTEMIC SURVEY OF 3576 PUBLISHED CASES FROM THE POINT OF VIEW OF OCCUPATIONAL HYGIENE

*FGUN EMNT POZRPP of Rospotrebnadzor, Yekaterinburg*

The publication compiles results of the systemic survey of 3576 published cases of mesothelioma, published in the Russian language for 126 years (1881 - 2006). Asbestos in general and chrysotile asbestos in particular was not found to be the leading environmental factor for mesothelioma development, nothing to say about its role as a precondition. The disease is of polyethiologic nature. In order to restore social fairness in respect to mesothelioma patients, it is necessary to develop an algorithm of profession-disease dependence, to establish the national cancer-register of mesothelioma cases and to study incidence of the disease in separate constituents of the Russian Federation and at the national level.[97]

## SOME SPECIFIC FEATURES OF ASBESTOSIS (A) CLINICAL COURSE IN CONTEMPORARY CONDITIONS

In order to study specific features of asbestosis (A) clinical course, 648 asbestosis cases were analysed - these cases were registered from 1946 to 2000, among employees of "Uralasbest" Co.
In 558 cases (86.1%) I grade A. was diagnosed, in 49 cases (7.6%) I-II grade A. was diagnosed and in 41 cases (6.3%) II grade A. was diagnosed.

In connection with improvement of labour conditions, clinical course of A substantially altered. A. morbidity decrease in 100 times, from 29.3 % to 0.3%. In 1947, 10 % of patients were under 19 and had occupational life under 3 years, while in the group of patients with occupational life over 20 years prevalence of A. reached 86.4 %. In 55 years of observation, the share of patients with II grade A. decreases from 25.6 % to 1.6% ($P<0.001$), while the share of I grade A. (the main clinic form of A. now) increased from 64.1% to 87.3 % ($P<0.001$); in 69.3 % of cases, I grade A. developed 20 or more years after the initial contact with asbestos-containing dust ($P<0.001$). In the period of observation, severity of the disease and associated respiratory deficiency decreases ($P<0.001$)[98].

## ASBESTOS-INDUCED DISEASES OF WORKERS OF ASBESTOS-CEMENT PRODUCTION FACILITIES

In order to develop actions for prevention of asbestos-induced lung diseases (AILDs), different risk factors of development of lung pathologies among workers of asbestos-cement plants were studied.

Clinical examination of 120 patients under prior exposure to asbestos-cement dust revealed that 71 patients (59.2 %) were earlier diagnosed occupational hand eczema. In the past they contacted with wet asbestos-cement mixtures, containing allergens (chromium, nickel and cobalt) and later were exposed to asbestos-cement dust. At average, 25.3 % of patients with occupational hand eczema, 10 years later were diagnosed AILDs: asbestosis (8.5 %), bronchitis (12.7%), and lung cancer (2.8%). In one case (1.4 %) asbestosis, lung cancer and hand eczema were diagnosed. A high correlation was found between AILDs and prior occupational eczemas, suggesting an additional risk factor for development of occupational lung diseases under impacts of asbestos-cement dust.[99]

[97] *S.V. Kashanskiy* Mesothelioma in Russia: a systemic survey of 3576 published cases from the point of view of occupational hygiene, FGUN EMNT POZRPP of Rospotrebnadzor, Yekaterinburg (Rus.).
[98] *Kashanski S.V., Novoselova T.A., Nikitina O.V.* FGUN "Yekaterinburg Medical Research Centre for Disease Prevention and Occupational Health of Industrial Workers" the RF Ministry of Public Health (Rus.)
[99] Plykhina A.E..GU R&D Institute of Occupational Health of the Russian Academy of Medical Sciences, Moscow (Rus.) .

## ASBESTOSIS WITH MASSIVE BENIGN PLEURA LESION[100]

A case of asbestosis was described - the patient was 65 years old woman, who had occupational contacts with asbestos for a long time. X-ray lung examination revealed asbestosis. Computer-aided tomography imaging suggested pleural tumours that were diagnosed as malignant mesothelioma. The diagnosis was supported by visual examination and biopsy. The final diagnosis: *Pleural asbestosis.*

Favel Kogan, Doctor of Sciences (Medicine) from Yekaterinburg Medical Research Centre for Disease Prevention and Occupational Health said - "I do not argue for considering asbestos "innocent". No. The truth is that chrysotile asbestos cay substantially increase cancer risks. But everything depends on doses and exposure conditions - e.g. continuous or periodical exposure, individual sensitivity, etc."

## EXPERIMENTAL PROOF OF POTENTIAL INDUCTION OF OFFSPRING TUMOURS BY TRANS-PLACENTARY MIGRATION OF CHRYSOTILE ASBESTOS FIBRES

*"Urals State Medical Academy" of the Federal Agency for Public Health and Social Development, FGUN EMNT POZRPP of Rospotrebnadzor, "Yekaterinburg Consultative and Diagnostic Centre", The Institute of Physic of Metals of the Urals Section of the Russian Academy of Sciences, Yekaterinburg*

Experiments on white rats allowed to reveal trans-placentary migration of chrysotile asbestos fibres from mother to foetus, accompanied by significant increase of incidence of tumours among the first generation offspring rats, predominantly malignant tumours of respiratory organs. Chronic impacts of chrysotile asbestos damaged lymphocytes in peripheral blood but do not affect bone marrow cells. Epidemiological studies would be necessary to allow extrapolation of these experimental data on trans-placentary effects of chrysotile asbestos to humans.[101]

## NON-PHARMACOLOGICAL CORRECTION OF CARDIO-RESPIRATORY DYSFUNCTIONS FOR PARENTS WITH ASBESTOS-INDUCED DISEASES (AILDS)[102]

Effects of non-pharmacological treatment on cardio-respiratory functions of AILDs patients were studied. Overall, 44 AILDs patients were observed (asbestosis, occupational bronchitis). 20 patients of the group (45.5 %) were found to have ischemic heart disease, 35 patients (79.6 %) had hypertension and 22 patients (50.0 %) were diagnosed arrhythmia. After the non-pharmacological treatment course, 39 patients were found to reduce bronchial obstruction, their bronchial resistance decreased by 9.8 %, and 57 % of patients demonstrated higher oxygen levels in arterial blood. 20 patients (86.9 %) of the group with initially elevated blood pressure demonstrated stabilisation. Daily electrocardiography monitoring of patients with arrhythmia revealed clear anti-arrhythmia effects.

[100] P.N. Lyubchenko, E.I. Vyatkina, S.E. Dubrova "An asbestosis case with massive benign pleura lesion" // Occupational health and industrial ecology. - 2007. # 4.- p. 35-39 (Rus.)

[101] N.N. Vanchugova, S.V. Kashanskiy, E.S. Tregubov, L.A. Skryabin, "Experimental proof of potential induction of offspring tumours by trans-placentary migration of chrysotile asbestos fibres" "Urals State Medical Academy" of the Federal Agency for Public Health and Social Development, FGUN EMNT POZRPP of Rospotrebnadzor, "Yekaterinburg Consultative and Diagnostic Centre", the Institute of Physic of Metals of the Urals Section of the Russian Academy of Sciences, Yekaterinburg. (Rus.)

[102] Obukhova T.Yu., Budkar L.N., Luzina N.G., Karpova E.A., Tereshina L.G. "Non-pharmacological correction of cardio-respiratory dysfunctions for patients with asbestos-induced diseases (AILDs), Medical Research Centre, Yekaterinburg, http://www.pulmonology.ru/old/Sod/Tezis-13/cont-54.htm (Rus.)

**PRODUCTION OF A TEST MODEL IMPACTOR FOR IDENTIFICATION OF ASBESTOS AND OTHER CARCINOGENS** [103]

The project was developed to organise a batch production of impactors for sampling and identification of asbestos and other carcinogens.
In the majority of cases, adverse health impacts of inhaled dust are associated with mineral forms and sizes of dust particles in additional to their chemical composition. Asbestos is the most widely known example of adverse health effects, that are predominantly determined by its mineral form instead of a toxic element.

Asbestos dust poses a major threat to human health. The process of development of asbestos-induced health effects in internal organs, lungs, etc. in very long (usually at least 10 - 15 years). Asbestos health effects are not studied in detail and some researchers assume that even a short-term exposure to air high elevated levels of asbestos dust may result is serious diseases.

In this connection, identification and quantification of asbestos and other carcinogens become fairly relevant.

"RGK Geophysical Company" (Moscow) with participation of N.M. Fedorovskiy Russian Institute of Mineral Resources, "Probotekhnika" Eco-company and Bauman Moscow State Technical University developed a comprehensive methodology for control of dispersion and mineralogical composition of dust, identification of carcinogens, inc. asbestos. The methodology was approved by the RF Ministry of Natural Resources (Methodological Recommendations No. 147 - "Sampling and Analysis of Solid Aerosols", Moscow 2002 г.). The methodology was tested in Moscow and Yaroslavl on emissions of asbestos technical products plants (3 plants in total).

The methodology allows to control dust composition in urban areas, in industrial facilities (both indoor and outdoor air) and identify contents, forms and sizes of carcinogenic components such as asbestos, quartz, heavy metals, radionuclides, phosphorus compounds, etc. (depending on a particular task).

In technical terms, the methodology requires application of PU-ER/220 sampler, that is applied by environmental services to sample particulate matter in all air pollution zones. The sampler allows to sample all airborne particulate, even at extremely low concentrations, on 10 $cm^2$ AFA filters. Dust samples are simultaneously collected on ground slides with application of the impactor nozzle, developed by "Probotekhnika" Eco-company for the first time in Russia. Dispersion analysis and mineralogical composition of dust samples are made with application of GIU-1 automatic analyser, developed by Bauman Moscow State Technical University (dispersion analysis) and "JSM-5300 + Link ISIS" electron beam microscope instrument (mineralogical composition). Such an approach allows to conduct dispersion and mineralogical analysis of particulates in industrial and urban air, with identification of specific radioactive and biologic aerosols. It is worth to note that now asbestos contents in air are measured either by gravimetry or by manual count of asbestos fibres using an optical microscope (after dissolution of a dust-bearing filter).

Application of this comprehensive approach allows to study different types of air pollutants swiftly and efficiently (an average sampling procedure takes about 30 min, while the dispersion analysis procedure takes less than 10 min to produce a statistically significant result).

The methodology is rather promising for city/regional sanitary and epidemiological services, territorial committees in charge of natural resources and environmental protection, mining facilities (inc. coal mines that face a serious problem of quartz identification and determination in coal mass) and industrial plants that apply asbestos and other carcinogens for technological purposes.

[103] http://www.inno.ru/project/14975/

## UKRAINE

In 25 recent years, only 19 cases of asbestosis were registered in Ukraine[104]. Medical statistical data suggest a low carcinogenic potency of chrysotile asbestos in the course of production of asbestos-containing products - no cases of occupational lung cancer or pleural mesothelioma have been registered. However, some note that medical control of health status of employees of asbestos-cement facilities is insufficient. The control is maintained by district polyclinics and often it is of formal nature.

Cancer-associated occupational health impacts of chrysotile asbestos and associated adverse workplace factors were studied for 3066 employees of asbestos-cement plants. Cancer pathology was diagnosed among 27 workers of the industry in 10 years. Annual average cancer-related morbidity was assessed as 88.1 cases per 100 000 of workers. Gender-adjusted statistics suggests that these pathologies are predominantly observed among men.

In terms of affected organs, incidence of tumours is substantially lower than levels for the general population, except liver cancer among men and women (2.3 - 4.8 times higher), lip cancer among men (2.3 times higher) and skin melanoma among women (1.8 time higher). Pleural, peritoneum and pericardium mesotheliomas were not registered.

In the course of study of morbidity levels vs. exposure to chrysotile asbestos, morbidity levels over averages were registered among workers under workplace exposure to chrysotile asbestos. However, besides chrysotile asbestos dust, development of tumours among these workers might be induced also by welding particulates, fine particulate silica and various pigments that require additional studies.

Malignant tumours were observed at high levels of occupational life (38.7±12.4 years) that might suggest low levels of exposure to chrysotile asbestos. The study authors do not rule out impacts of other workplace carcinogens on the workers. Unfortunately, it is impossible to assess relative risks estimated by the study authors because the publications did not specify relevant confidence intervals.

At the base of analysis of epidemiological research data, the WHO Working Group assumed that the level of 100 fibres/$m^3$ (or 200 fibres/$m^3$ if measured by electron beam microscope) results in summary asbestos-induced lung cancer risk of $4 \times 10^{-5}$ for smokers and $2.2 \times 10^{-5}$ for non-smokers.

## KAZAKHSTAN

Kazakhstan initiated its own research studies as results of Russian and Western scientists are often contradictory. According to Nurlan Omarov, the Chairman of the Chrysotile Association, the Government requested the National Occupational Health Centre to study chrysotile health impacts in detail.

The requested research will be the first such study of Kazakhstan researchers. The Government is expected to formulate its position on the issue at the base of conclusions of the Centre's specialists[105].

## KYRGYZSTAN

In 2001, the Government of the Republic of Kyrgyzstan approved a decree with the list of mental health-related restrictions for employment in some spheres of professional and other activities, associated with high risks, impacts of hazardous substances and adverse workplace factors. General

[104] Is it possible to use chrysotile asbestos safely? Ukrainian experience / V.I. Chernyuk, T.K. Kucheruk, I.P. Lubyanova et al. - K., 2008. - 36 p. (Rus.)

[105] Chemical security problems, http://ecology.iem.ac.ru/ucs/b1313.txt (Rus.)

mental health restrictions include chronic and protracted mental disorders with persistent or regular manifestations, inc. epilepsy.

The list refers to asbestos-containing substances (asbestos contents over 10%) and associated exploration, mining and processing of asbestos ore and asbestos, as well as production and processing of artificial asbestos. Besides that, the list refers to asbestos-containing substances with asbestos contents under 10% and association production processes, reprocessing of asbestos-cement, asbestos-rubber and other products.

## Chapter 3

## NATIONAL REGULATION OF ASBESTOS MANAGEMENT

## RUSSIA

The due regulations and methodologies of the Russian Federation in the sphere of so-called safe and controlled use of chrysotile asbestos were mainly developed in 50 recent years. In that time, more than 100 methodologies were developed in spheres of hygiene, occupational pathology, cancer epidemiology, experimental and industrial toxicology.[106]

The modern stage in the asbestos management process started in 1997, when Russian companies technologically associated with mining, clarification and processing of chrysotile asbestos, leading medical and technological R&D institutes, some ministries and agencies established a non-profit organisation - the Asbestos Association (or the Chrysotile Association from 2003), that later became a member of the International Asbestos Association. At the initial stage of its activities, the Asbestos Association dealt with preparations to ratification of Convention No. 162 by Russia. In the framework of activities, associated with development of necessary documents for the ratification, the RF Government Decree No. 869 on RF Position on Use of Chrysotile Asbestos of July 31, 1998 was drafted and approved. The Decree states: "The Russian Federation supports provisions of ILO Convention No. 162 of 1986 Concerning Safety in the Use of Asbestos and believes that compliance with the said Convention with parallel implementation of comprehensive organisational and technical measures to control use of chrysotile asbestos and products made with its application would guarantee environmental and health safety of its use".

At the second stage, sanitary rules for "Handling Asbestos and Asbestos-containing Materials" (SanPiN 2.2.3.757-99) and "Interagency Occupational Safety Rules in Production of Asbestos and Asbestos-containing Materials and Items" (POT RM-010-2000), were developed at the base of more than 50 years of Russian and international studies on different aspects of the problem of asbestos and health. After several years of intensive preparations, on April 8, 2000 Federal Law RF # 50_FZ was endorsed on Ratification of Convention of 1986 Concerning Safety in the Use of Asbestos (Convention No. 162). From that time, the new stage started in development of underlying regulations and methodologies, ensuring regulated use of chrysotile asbestos in the country.

In order to improve underlying regulations and methodologies, the Interagency Program for Review and Amending Some Due Documents and Development of New Ones was developed. Besides that. some activities were incorporated into Federal Program for Improvement of Labour Conditions and Occupational Health for 2001 - 2005. In the framework of these programs, from 2000 to 2004, 21 regulations and methodologies were drafted, agreed and enacted, 5 documents undergo co-ordination and approval, and 4 other documents are being developed in the framework of R&D work plan of the Chrysotile Association.

[106] http://www.snip-info.ru/Sanpin_2_2_3_757-99.htm

Now, the Russian Federation has developed a framework of underlying regulations and methodologies for use of chrysotile asbestos at all its lifecycle stages - from mining to waste utilisation.

The Association plans of R&D activities incorporate documents that should be developed in the nearest future in connection with enactment of Federal Law of the Russian Federation No. 184_FZ on Technical Regulation of December 27, 2002, the Concept of Health Protection of the Healthy in the Russian Federation and the Sectoral Program for Health Protection and Improvement of the Healthy for 2003 - 2010.

The list of these documents includes the Technical Regulations on Safety of Chrysotile, Chrysotile-containing Materials and Items, Processes of their Production, Transportation, Storage, Sale and Utilisation as the first priority document. In the course of its development, applicable safety requirements were analysed, pertaining to chrysotile asbestos, chrysotile-containing materials and items in the course of their production life cycles. Applicable requirements were analysed in the due Russian regulations and methodologies in the sphere of health and environment, and public health in order to check whether these requirements may be used in the new Technical Regulations.

In June 2007, the Public Council on Technical Regulation under the RF Ministry of Energy and Industry conducted regular public hearings on the draft special Technical Regulations on Safety of Chrysotile, Chrysotile-containing Materials and Items, Processes of their Production, Transportation, Storage, Sale and Utilisation (the draft was developed by the R&D Institute of Asbestos Industry). The draft developers were recommended to add control and supervisory bodies into the list of subjects of legal relations. Besides that, the Public Council argued that the draft Technical Regulations lack specific requirements to safety of chrysotile and chrysotile-containing materials and items. In this connection, the Council recommended to incorporate relevant requirements to the draft Technical Regulations (such requirements are listed in agency-specific technical regulations, including sanitary rules for handling of asbestos and asbestos-containing materials, sanitary standards that provide lists of cancer-inducing substances, products, production processes, hygiene requirements to construction and construction works).

The Public Council advised the developers on the need to specify inter-relations between concepts of "chrysotile-containing materials", "chrysotile-containing items" and "chrysotile-containing waste". The Council believes that the developers should exclude provisions on chrysotile substitutes from the draft Technical Regulations if such substitutes are not so hazardous as chrysotile asbestos itself. Besides that, the draft Technical Regulations do not contain requirements (e.g. MACs) to levels of polluting amphibole asbestos in other materials (e.g. in talc), and to application of chrysotile-containing materials in railway embankments. The Public Council noted that the draft lacks provisions on state supervision and separation of spheres of competence of executive control and supervision bodies.

In 2003, Sanitary Rules and Norms - SanPin 2.1.7.1322-03 "Sanitary Requirements to Disposal and Neutralisation of Consumption and Production Waste" were endorsed and approved by the Chief State Sanitarian of the Russian Federation (on April 30, 2003).In the same year, Methodological Guidelines on "Collection, Transportation and Burial of Asbestos-containing Waste"[107]. The Guidelines were developed pursuant to Federal Law No. 52-FZ on Sanitary and Epidemiological Well-being of the Population of March 30, 1999, Federal Law No. 89-FZ on Production and Consumption Waste of June 24, 1998, sanitary rules for Handling Asbestos and Asbestos-containing Materials (SanPiN 2.2.3.757-99), ILO Convention No. 162 of 1986 (No. 162) and Recommendations of 1986 (No. 172). The Methodological Guidelines define requirements to collection, transportation and burial of asbestos-containing waste to prevent their adverse environmental and health impacts and use the waste as a secondary resource.

[107] http://9214123.ru/kons/40347.html

## UKRAINE

In Ukraine, the national regulation of asbestos management incorporates economic, environmental and sanitary, social and labour dimensions.

### *Economic regulation*

Pursuant to Law of the UkrSSR on Economic Independence of the Ukrainian SSR of August 3, 1990[108], to improve economic management mechanisms, to promote economic initiatives of employees, to meet growing demand of economy of the republic in cement and asbestos-cement products, the Council of Ministers of the Ukrainian SSR approved proposals of labour collectives and organisations of the cement industry of the republic on establishment of the Ukrainian State Concern of Cement and Asbestos-cement Products (Ukrcement)[109]. Ukrcement Concern existed up to March 13, 2002[110] and incorporated 18 plants and organisations.

Economic regulation incorporates *transport regulation* as a subordinate sphere, transport regulations are more closely associated with prevention of asbestos pollution in the course of its transportation.
According to Annexes to para. 1 of Rules of Cargo Transportation in Open Railway Vans[111] asbestos-cement products may be transported in open railway vans.
At the same time, Annexes to Order No. 54 of the Ministry of State Resources of Ukraine of July 28, 1992[112] stipulate that asbestos-cement products should be transported in bags and special containers.

Technical Operation and Maintenance Rules of Thermal Installations and Networks[113] prohibit application of asbestos-containing materials for external insulation without application of protective coatings that meet applicable sanitary norms for asbestos-handling operations.

### *Environmental and sanitary regulation*

According to Article 13 of Law of Ukraine on Environmental Expert Assessments[114] the Cabinet of Ministers of Ukraine approved the list of highly environmentally hazardous activities and sites[115], subject to mandatory state expert assessments (the list was drafted by the Ministry of Environment and Radiation Safety and the Ministry of Public Health). The list incorporates the industry of construction materials (production of cement, asphalt-concrete, asbestos and glass - para 11).

Order of the State Commission on Mineral Resources "On Approval of the Manual on Application of the Classification of Deposits and Mineral Resources of the State Mineral Fund to Sand and

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[108] Law of UkrSSR on Economic Independence of the Ukrainian SSR, No. 142-XII of 03.08.1990, Communications of the Verkhovna Rada of UkrSSR, 1990, # 34 (21.08.90), p. 499. (Ukr.)
[109] Decree of the Council of Ministers of UkrSSSR on Establishment of the Ukrainian State Concern of Cement and Asbestos-cement Products, # 238 of 01.09.1990. (Ukr.)
[110] Decree of the Cabinet of Ministers of Ukraine on Amending Decree of the Cabinet of Ministers of Ukraine No. 551 of April 23, 1998 and Declaring Void Some Decisions of the Council of Ministers of the Ukrainian SSR # 292 of 13.03.2002, The Official Communications of Ukraine, 2002, # 12 (05.04.2002), p. 565. (Ukr.)
[111] Order of Ministry of Transport "Rules of Cargo Transportation in Open Railway Vans" # 542 of 20.08.2001, The Official Communications of Ukraine, 2001, # 37 (28.09.2001), p. 1721. (Ukr.)
[112] Order of the Ministry of State Resources "On the Range of Products and Items that should be Transported in Bags and Special Containers" # 54 of 28.07.1992. (Ukr.)
[113] Order of the Ministry of Fuel and Energy "On Approval of the Technical Operation and Maintenance Rules of Thermal Installations and Networks" #$ 71 of 14.02.2007, The Official Communications o Ukraine, 2007, # 17 (16.03.2007), p. 689. (Ukr.)
[114] Law of Ukraine on Environmental Expert Assessments # 45/95-VR of 09.02.1995, Communications of the Verkhovna Rada of Ukraine, 1995, # 8 (21.02.95), p. 54. (Ukr.)
[115] Decree of the Cabinet of Ministers of Ukraine on the List of Highly Environmentally Hazardous Activities and Sites, # 554 of 27.07.1995, The Compendium of Decrees of the Government of Ukraine, 1995, # 10, p. 252. (Ukr.)

Gravel Deposits" No. 198 was registered by the Ministry of Justice under No. 819/14086[116]. The Manual categorises asbestos in sand as a polluting impurity.

Pursuant to Law of Ukraine on Ensuring Sanitary and Epidemiological Well-being of the Population[117], the State Sanitary Rules for Planning and Development in Settlements (the Rules were developed for the first time)[118]. Annex 4 to the Sanitary Rules (approved by Order No. 173 of the Ministry of Public Health of Ukraine of June 19, 1996) stipulates sanitary classification of plants, production facilities, constructions and associated sanitary protection zones.

For example:

- Chemical production facilities - Class II. Sanitary protection zone - 500 m. The class includes facilities for production of *asbestos* products (No. 25).
- Mining of ores and non-metallic mineral resources - Class III. Sanitary protection zone 300 m. The class includes mining facilities of VI - VII categories, including open cast extraction of dolomite, magnetite, *asbestos*, asphalt, etc.
- Construction materials facilities - Class II. Sanitary protection zone - 500 m. The class includes *asbestos* production (No. 2).
- Class IV. Sanitary protection zone - 100 m. The class includes production of *asbestos-cement* products (No. 4).

The State Sanitary Rules for Protection of Ambient Air in Settlements (from pollution by chemical and biological agents)[119] were developed according to the Framework Public Health Legislation[120], Law of Ukraine on Ensuring Sanitary and Epidemiological Well-being of the Population[121], Law of Ukraine on Environmental Protection[122], Law of Ukraine on Atmosphere Air Protection[123] and stipulate key requirements to air protection in human settlements and recreation zones. The Rules should ensure prevention of adverse impacts of air pollution on public health and sanitary living conditions. The Rules stipulate quantitative maximal allowed concentrations (MACs) including MAC for *asbestos-containing dust* (with *chrysotile asbestos contents under* 10 %). The MAC is measured in mg/m$^3$ and refers to average daily exposure.

Pursuant to Decree No. 1556 of the Cabinet of Ministers of Ukraine of October 13, 2000 on Implementation of the National Health and Environment Action Plan for 2000 - 2005[124] and Directive No. 37644 of the Cabinet of Ministers of Ukraine of 06.08.2003, the Ministry of Environment of Ukraine issued Order on Development of Annual Reports on Implementation of the National Health and Environment Action Plan for 2000 - 2005[125].

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[116] Order of the State Commission on Mineral Resources "On Approval of the Manual on Application of the Classification of Deposits and Mineral Resources of the State Mineral Fund to Sand and Gravel Deposits" # 198 of 25.06.2007, The Official Communications of Ukraine, 2007, # 53 (30.07.2007), p. 2178. (Ukr.)

[117] Law of Ukraine on Ensuring Sanitary and Epidemiological Well-being of the Population, # 4004-XII of 24.02.1994, Communications of the Verkhovna Rada of Ukraine, 1994, # 27 (05.07.94), p. 218. (Ukr.)

[118] Order of the Ministry of Public Health on Approval of the State Sanitary Rules for Planning and Development in Settlements, # 173 of 19.06.1996. (Ukr.)

[119] Order of the Ministry of Public Health "The State Sanitary Rules for Protection of Ambient Air in Settlements (from pollution by chemical and biological agents)" # 201 of 09.07.1997. (Ukr.)

[120] The Framework Public Health Legislation of Ukraine # 2801-XII of 19.11.1992, Communications of the Verkhovna Rada of Ukraine, 1993, # 4 (26.01.93), p. 19. (Ukr.)

[121] Law of Ukraine on Ensuring Sanitary and Epidemiological Well-being of the Population, # 4004-XII of 24.02.1994, Communications of the Verkhovna Rada of Ukraine, 1994, # 27 (05.07.94), p. 218. (Ukr.).

[122] Law of UkrSSR on Environmental Protection # 1264-XII of 25.06.1991, Communications of the Verkhovna Rada of Ukraine, 1991, # 41 (08.10.91), p. 546. (Ukr.)

[123] Law of Ukraine on Atmosphere Air Protection # 2707-XII of 16.10.1992, Communications of the Verkhovna Rada of Ukraine, 1992, # 50 (15.12.92), p. 678. (Ukr.)

[124] Decree of the Cabinet of Ministers of Ukraine on Measures to Improve Health and Environment for 2000 - 2005 # 1556 of 13.10.2000, The Official Communications of Ukraine, 2000, # 42 (03.11.2000), p. 1793. (Ukr.)

[125] Order of the Ministry of Environment of Ukraine on Development of Annual Reports on Implementation of the National Health and Environment Action Plan for 2000 - 2005 # 162 of 16.04.2004.(Ukr.)

According to these documents, every year, information should be compiled on implementation of measures stipulated in relevant sections of the Action Plan and the Annex. In particular, there were plans to assess population cancer risks associated with asbestos production and use after introduction of relevant restrictions in 2003.

Standards were legislatively set for emission limits of carcinogenic pollutants[126]. Mass concentrations of carcinogenic pollutants should not exceed the fixed levels of emission limits. The first hazard class incorporates - *asbestos* (chrysotile, crocodilite, etc.) as fine particulates.

***Social and labour regulation***

According to requirements of Article 18 of Law of Ukraine on Occupational Health[127], Decree of the President of Ukraine on Matters of the State Committee of Ukraine for Occupational Health Supervision[128] of 16.01.2003 and to set requirements to training and examination of officials and other employees in the sphere of occupational heath, the State Committee of Ukraine for Occupational Health Supervision issued Order of January 26, 2005 (registered by the Ministry of Justice on February 15, 2005) for approval of the List of Hazardous Works[129].
In para 40, the List includes production and application of glass/mineral wool and asbestos.

According to laws of Ukraine on Occupational Health"[130], on Ensuring Sanitary and Epidemiological Well-being of the Population[131], the Sanitary Classification of Works by Workplace Hazards, Physical Load and Labour Intensity[132], that was enacted on March 1, 2002.

The list of workplace MACs for particulate matter incorporates MACs for silicate-containing dust, silicates and aluminosilicates:

a) natural asbestos (chrysotile, etc.) and synthetic asbestos, as well as mixed asbestos-containing dust with asbestos contents over 20 %;
b) asbestos and rock dust with asbestos contents from 10 to 20 %;
c) asbestos and rock dust with asbestos contents under 10 %;
d) asbestos-cement;
e) asbestos-bakelite, asbestos-rubber, etc.

Order No. 46 of the Ministry of Public Health of Ukraine was approved on March 31, 1994 and registered by the Ministry of Justice on June 28, 1994 under No. 176/385. The Order approved the List of Hazardous and Heavy Works where Use of Adolescent Labour is Prohibited[133].

Petrochemical production

Production of asbestos-based technical products - All workers of mainstream technological operations.

[126] Order of the Ministry of Environment of Ukraine on Approval of Emission Limits of Pollutants from Fixed Sources # 309 of 27.06.2006, The Official Communications of Ukraine, 2006, # 31 (16.08.2006), p. 2259. (Ukr.)
[127] Law of Ukraine on Occupational Health # 2694-XII of 14.10.1992, Communications of the Verkhovna Rada of Ukraine, 1992, # 49 (08.12.92), p. 668. (Ukr.)
[128] Decree of the President o Ukraine on Regulations of the Ministry of Ukraine of Emergency Response and Population Protection from Consequences of the Chernobyl Disaster # 1430/2005 of 10.10.2005, The Official Communications of Ukraine, 2005, # 41 (26.10.2005), p. 2599 (Ukr.)
[129] Decree of the State Committee of Ukraine for Occupational Health Supervision "The List of Hazardous Works" # 15 of 26.01.2005, The Official Communications of Ukraine, 2005, # 8 (11.03.2005), p. 455. (Ukr.)
[130] Law of Ukraine on Occupational Health # 2694-XII of 14.10.1992, Communications of the Verkhovna Rada of Ukraine, 1992, # 49 (08.12.92), p. 668. (Ukr.).
[131] Law of Ukraine on Ensuring Sanitary and Epidemiological Well-being of the Population, # 4004-XII of 24.02.1994, Communications of the Verkhovna Rada of Ukraine, 1994, # 27 (05.07.94), p. 218. (Ukr.).
[132] Order of the Ministry of Public Health on Approval of the Sanitary Classification of Works by Workplace Hazards, Physical Load and Labour Intensity. # 528 of 27.12.2001, Everything about Accounting, 2004, 10, # 100. (Ukr.)
[133] Order of the Ministry of Public Health on Approval of the List of Hazardous and Heavy Works where Use of Adolescent Labour is Prohibited. # 46 of 31.03.1994. (Ukr.)

Production of construction materials

General occupations:

Maintenance of equipment in production of asbestos-based technical products;
Production of asbestos-cement products;
Automatic production of asbestos-cement plates;
Cutting of asbestos-cement and asbestos-silicate products;
Shaping of asbestos-cement plates.

Pursuant to Law of Ukraine on Occupational Health[134], the List of Hazardous and Heavy Works where Use of Women's Labour is Prohibited[135] was approved.

In relevant cases labour under asbestos exposure entails some benefits: annual additional vacations for heavy and hazardous labour conditions[136] and a shorter working week[137].

Workers employed in production of asbestos-cement and other asbestos-containing materials (pipes, roofing plates, friction plates, asbestos-based textile, etc.) may be affected by diseases associated with impacts of industrial particulates - these diseases are classified as occupational ones[138].

According to Article 13 of Law of Ukraine on Pension Security[139] the Cabinet of Ministers of Ukraine approved Decree on Approval of the List of Facilities, Works, Professions, Positions and Parameters where Employers are Entitled to Old Age Pensions at Preferential Terms[140]. These lists included asbestos mining and clarification; production of asbestos-cement, asbestos-silicates and asbestos-based cardboard.

Prospects of technological development and technologic priorities of Ukraine stipulate development of mew materials and products. Implementation of the program for production of basalt fibres and materials at the base of these fibres is fairly relevant. Application of these materials would allow to develop a large-scale production of durable basal fibres and materials, allowing to overcome shortages of timber, metals and glass fibres in Ukraine and substitute carcinogenic asbestos completely.[141]

## KAZAKHSTAN

According to requirements of Sanitary Rules for Asbestos-handling Works (1.07.085-97), approved by the Chief Sanitarian of Kazakhstan on 11.06.97 (para. 9.1.), asbestos-containing materials maybe used without restrictions for roofing, constructions or exterior walls of all types of buildings. Asbestos-containing materials are allowed for application in drinking and hot water supply networks.

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[134] Law of Ukraine on Occupational Health # 2694-XII of 14.10.1992, Communications of the Verkhovna Rada of Ukraine, 1992, # 49 (08.12.92), p. 668. (Ukr.).

[135] Order of the Ministry of Public Health on Approval of the List of Hazardous and Heavy Works where Use of Women's Labour is Prohibited. # 256 of 29.12.1993.(Ukr.)

[136] Decree of the Cabinet of Ministers of Ukraine on Approval of the List of Facilities, Works, Professions and Positions, where Employees are Entitled to Additional Annual Vacations for Work in Hazardous and Heavy Labour Conditions and for Special Works # 1290 of 17.11.1997, The Official Communications of Ukraine, 1997, vol. 48 (18.12.97), p. 22. (Ukr.)

[137] Decree of the Cabinet of Ministers of Ukraine on Approval of the List of Facilities, Workshops, Works, Professions and Positions, where Employees are Entitled to Shorter Work Week # 163 of 21.02.2001, The Official Communications of Ukraine, 2001, # 9 (16.03.2001), p. 352. (Ukr.)

[138] Decree of the Cabinet of Ministers of Ukraine on Approval of the List of Occupational Diseases # 1662 of 08.11.2000, The Official Communications f Ukraine, 2000, # 45 (24.11.2000), p. 1940. (Ukr.)

[139] Law of Ukraine on Pension Security # 1788-XII of 05.11.1991, Communications of the Verkhovna Rada of Ukraine, 1992, # 3 (21.01.92), p. 10. (Ukr.)

[140] Decree of the Cabinet of Ministers of Ukraine on Approval of the List of Facilities, Works, Professions, Positions and Parameters where Employers are Entitled to Old Age Pensions at Preferential Terms # 36 of 16.01.2003, The Official Communications of Ukraine, 2003, # 4 (07.02.2003), p. 102. (Ukr.)

[141] Address of the President to Ukraine to the Verkhovna Rada of Ukraine on Internal and Foreign Affairs of Ukraine in 2002 of 15.04.2003. (Ukr.)

Asbestos-containing products are covered by Law of the Republic of Kazakhstan on Safety of Chemical Products of July 21, 2007 (No. 302)[142].
The Law stipulates the legislative framework for ensuring safety of chemical products in order to protect human life and health, the environment and consumers' interests at the territory of Kazakhstan. The Law was enacted on January 1, 2008.

Besides that, there are some sanitary norms and rules in Kazakhstan, pertaining to handling of asbestos and asbestos-containing materials (SanPiN 2.2.4.1191-03)

The asbestos industry belongs to the sphere of interests of the Government of Kazakhstan.
On June 19, 2008, the deputy PM U.E. Shikeev chaired a regular meeting of the Three-party Republican Commission on Social Partnership and Regulation of Social and Labour Relations. The meeting participants considered development of a common position on asbestos, inc. chrysotile asbestos. The Commission accounted for socio-economic importance of chrysotile mining industry and the need to develop it further, provided controlled and responsible use of chrysotile.

On February 4, 2008, Decree No. 96 of the Government of the Republic of Kazakhstan was enacted on approval of the Technical Regulations on Safety of Construction Materials, Items and Constructions. Central and local executive bodies should ensure harmonisation of their regulations with the new Technical Regulations.

**The list**
**of construction materials, items and constructions,**
**subject to safety requirements**

| **Asbestos-cement products**<br>13.02.2008 г. | |
|---|---|
| 6812 | Asbestos-cement sheets |
| 6812 | Asbestos-cement pipes and sleeves |
| 6812 | Other asbestos-cement products and asbestos-cement production waste |
| 2524 00 | Asbestos |

## KYRGYZSTAN

**The range of regulations and standards**, was approved by the Chief State Sanitarian of the Kyrgyz Republic (# 9 of 20.02.2004), and registered by the Ministry of Justice (under reg. # 34-04 of 19.03.04)[143]

| | |
|---|---|
| SanPiN 2.2.3.013- 3 | Handling asbestos and asbestos-containing materials |

Implementation of environmental management plans (EMPs) is stipulated in the Kyrgyz Republic (EMPs, January 2008 - environmental screening, assessment of potential impacts and management of the system of environmental actions) These plans will be developed according to WB manuals, laws and regulations of the borrower. The plans will describe anticipated environmental impacts and sound practices for emission control (e.g. particulates, exhaust gases) control of noise, wastewater discharges and management of on-site solid construction waste.
Some asbestos management rules are stipulated. In particular, if asbestos is used on a construction site, it should be clearly marked as a hazardous material. As appropriate, asbestos should be stored in closed containers to minimise its adverse impacts. In the course of asbestos-removal operations, asbestos should be moistened to minimise releases of asbestos dust. Asbestos handling and removal operations should be conducted by skilled and experienced specialists.

[142] http://gosnadzor.memst.kz/files/himprod.htm
[143] http://www.gsen.in.kg/ru/perechen

In cases of temporary storage of asbestos-containing waste, such waste should be stored in closed containers with relevant labels. (Approved by Decree No. 344 of the Government of the Kyrgyz Republic of July 13, 2001).

## Chapter 4

## INTERNATIONAL REGULATION OF ASBESTOS MANAGEMENT

**The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade**[144] celebrates its 10th anniversary in 2008.

The Rotterdam Convention seeks to promote introduction of common responsibility and coordinated efforts of Parties in the international trade in certain hazardous chemicals to protect human health and the environment from potential adverse impacts and facilitate their environmentally sound use by promotions of information exchange on their properties, by introduction of decision-making procedures on their import and export at the national level and sharing these decisions among Parties.

The Rotterdam Convention promotes countries to share responsibility and co-operate in trade in certain hazardous chemicals. The Convention facilitates environmentally rational use of these substances, assisting in exchange of information on their properties, setting the national decision-making process on export and import of chemicals and notifying the Parties on the decisions made.

The Convention came into effect on February 24, 2004. It was signed by 73 countries and 120 counties have already ratified it. Kazakhstan acceded to the Convention on November 1, 2007, Ukraine acceded to the Convention on December 6, 2002, Kyrgyzstan signed the Convention on August 11, 1999 and ratified it on May 25, 2000. Russia is not a Party of the Rotterdam Convention (as at March 17, 2008).

The Convention sets a list of substances that were banned or severely restricted in at least 2 regions. Prior to export a chemical in the Convention List to a developing country, a facility in a Party of the Convention must inform on the government of the developing country on the matter in advance, and the government may refuse the delivery of the chemical in question.

Now, Annex III to the Rotterdam Convention contains the list of 39 chemicals - 28 pesticides and 11 industrial chemicals that are banned or severely restricted in Parties of the Convention. Such bans or restrictions on use were imposed according to environmental and health safety considerations. The Convention List includes asbestos (crocodilite, actinolite, anthoplyllite, amosite and tremolite).

At the last meeting of Parties of the Convention in 2006, more than 100 countries agreed with recommendations of the Chemical Review Committee on incorporation of chrysotile asbestos into the Convention List. However, Canada, India, Kyrgyzstan, Iran, Peru and Ukraine, as Parties of the Convention, prevented inclusion of asbestos to the PIC list. They got support from Zimbabwe, Russia and Indonesia that have not ratified the convention yet (only after ratification a country may expect that its view will be accounted for).

In late 2008, three new substances (chrysotile asbestos, endosulfan and tributyltin) may fall under jurisdiction of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

The European Commission believes that it is very important to incorporate these substances to the PIC list in order to ensure protection of countries that import the above chemicals. In EU member-states, all these three substances are banned or are subject to firm requirements of environmental law. Their export is regulated by stricter legislative provisions than those of the Convention.

[144] www.pic.int

**OPTIONS FOR INCORPORATION OF ASBESTOS INTO THE PIC LIST OF THE ROTTERDAM CONVENTION**

According to Donald Cooper, the Executive Secretary of the Rotterdam Convention and the Executive Secretary of the Stockholm Convention, three potential options are being discussed now:
1. To develop a new Annex to the Convention, allowing countries some additional time before agreeing to transfer asbestos into the main list of the Convention.
2. To amend the existing Annex with the list of chemicals subject to Prior Informed Consent procedure, allowing counties to get temporary exceptions.
3. To make the requirement to prior informed consent of the Rotterdam Convention a requirement of voluntary nature, allowing countries to decide voluntarily whether to make commitments on Annex III chemicals.

NGOs believe that the latter option is a substantial step back, that might result in a situation when the Rotterdam Convention does not exists and all decisions in the sphere are made on the voluntary basis. However, some NGOs argue that options 1 and 2 are likely to weaken the Rotterdam Convention seriously and to erode its essence, that is unacceptable in connection with hazardous chemicals.

**Convention on Environmental Impact Assessment in a Transboundary Context**[145]
Paragraph 5 of the Convention in Annex 1 (the list of activities) stipulates:
"Installations for asbestos extraction and processing, and processing and transformation of asbestos and asbestos-containing products: for asbestos-cement products - with annual output more than 20,000 tons of finished products; for friction materials - with annual output more than 50 tons of finished products; for other applications of asbestos - with annual application more than 200 tons".

Thus a question arises, whether any of the above activities general substantial adverse transboundary impacts?

**International Labour Organisation Convention No. 162 Concerning Safety in the Use of Asbestos**[146] was endorsed at 72nd session of ILO General Conference in Geneva on June 24, 1986 and came into effect on June 16,1989.[147] The Convention covers all activities associated with occupational impacts of asbestos. The Convention defines such terms as "asbestos", "asbestos dust," etc.

The Convention provides for prevention of asbestos impacts and protection of workers, it prescribes methods of monitoring of hazardous occupational factors and human health. The document obliges to promote information dissemination and raising workers' awareness of hazardous occupational factors, to promote training of workers dealing with asbestos and training on environmental protection matters.

Paragraph 1of Article 3 of the Convention states: "National legislation or rules shall prescribe necessary measures for prevention, control and workers' protection in connection with adverse health impacts emerging in the course of dealing with asbestos". Implementation of this provision includes development of regulations and methodologies to ensure safe controlled application of asbestos at the base of the national legislation, and accounting for international experience.

As at September 1, 2001, ILO Convention No. 162 Concerning Safety in the Use of Asbestos was ratified by 26 countries.[148]

[145] Convention on Environmental Impact Assessment (EIA) in a Transboundary Context http://www.unece.org/env/eia/
[146] Convention Concerning Safety in the Use of Asbestos. International Labour Organisation, # 162 of 24.06.1986, International Occupational Safety and Health Law, 1997, 01, v 1. (Ukr.)
[147] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=993_041
[148] Statute of the International Labour Organisation of 28.06.1919.

**Recommendation No. 172** concerning safety in the use of asbestos[149] amended ILO Convention No. 162 and is officially titled: **Recommendation on Asbestos of 1986**. The Recommendation should be applied for all activities, associated with risks of occupational asbestos impacts.

**Practical occupational health and safety rules concerning the use of asbestos**, were published by the International Labour Office in 1984. These rules set principles of policies and activities at the national level.

**Convention No. 167 on Occupational Safety and Health in Construction.**[150]
The Convention was endorsed at 75th session of ILO General Conference in Geneva on June 20, 1988 and covers all types of construction activities, inc. civil construction, assembling and demolition works, including all on-site operations or transportation from siting to completion.

Issues of export and import of asbestos products are also addressed at the level of international law.

**The Strategic Approach to International Chemicals Management**

In 2006, governments and stakeholder groups approved a new global policy and strategy known as the Strategic Approach to International Chemicals Management (SAICM).[151] The Strategic Approach seeks to alter production and use of chemicals in order to minimise their adverse health and environmental impacts.

SAICM was approved by consensus ministers of environment, public health and other delegates from more than 100 governments participating in the First International Conference of Chemical Management (ICCM-1), in Dubai in February 2006. The Conference was organised by UNEP with active support of WHO and other international organisations that have programs associated with chemicals.[152]

SAICM incorporates 3 texts: the Dubai Declaration on International Chemicals Management, the Overarching Policy Strategy and the Global Action Plan.[153] SAICM Secretariat was established to assist in holding meetings and to support implementation. A short-term Quick Start Program (inc. a small trust fund) was established to assists developing countries in launching SAICM implementation.

One of SAICM aims is associated with risks reduction, namely: "to protect workers from chemicals causing asbestosis, other asbestos-related diseases and occupational cancers, those chemicals included in the Rotterdam Convention because of their occupational risks and other hazardous chemicals based on their occupational health risks".

## Chapter 5

## PUBLIC PARTICIPATION

Non-governmental organisations support position of the World Health Organisation, the International Labour Organization, the International Programme on Chemical Safety, the European Union, the International Social Security Association, the World Trade Organization, the

[149] Recommendation No. 172 concerning safety in the use of asbestos of 24.06.1986, International Occupational Safety and Health Law, 1997, 01, v. 1. (Ukr.)
[150] Convention No. 167 on Occupational Safety and Health in Construction http://abro.lawmix.ru/index.php?id=10856 (Rus.)
[151] The text of the SAICM core documents and the full meeting report is available in the six United Nations Languages at: http://www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm
[152] These included besides UNEP and WHO: the International Labour Organizations (ILO); the U.N. Food and Agriculture Organization (FAO); the United Nations Development Program (UNDP); the United Nations Industrial Development Organization (UNIDO); the United Nations Institute for Training and Research (UNITAR); the World Bank; the Organization for Economic Co-operation and Development (OECD) and others.
[153] The documents and resolutions adopted at the Dubai ICCM are available in all six United Nations languages and can be downloaded at: http://www.chem.unep.ch/saicm/SAICM%20texts/SAICM%20documents.htm

International Commission on Occupational Health, the International Federation of Building and Woodworkers, the International Metalworkers' Federation and governments of more than 40 countries call for banning chrysotile asbestos and refuse application of asbestos-containing products.

In their activities non-governmental organisations rely on the decision of the Chemical Review Committee of the Rotterdam Convention that recommended to include asbestos into the PIC list. NGOs are convinced in the need to abandon disputes on hazards of different types of asbestos, arguing that all these substances are hazardous. Civil society organisations believe that developed countries that call for continued global use of asbestos, but reduce or ban its use at home, behave as colonialists in respect to developing countries, depriving them of their rights to prior informed consent on asbestos import.

Immediately before the meeting of the Chemical Review Committee of the Rotterdam Convention in Geneva, in March 2008, non-governmental organisations issued their appeal to members of the Committee, attracting their attention to the fact that it is unacceptable to meet interest of asbestos industry to the detriment of human health, particularly health of workers of asbestos-producing and asbestos-processing facilities.

The appeal was signed by representatives of 58 NGOs of different countries, including NGOs from EECCA countries: Azerbaijan, Armenia, Moldova, Russia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan.

They expressed their concerns about continued application of chrysotile asbestos in the Works, particularly in developing countries, unresolved problems of management of asbestos-containing waste and continued air emissions of asbestos - the key route of human exposure to asbestos.

In August - September 2008, seminars were conducted in Russia, Kazakhstan and Ukraine to discuss "asbestos" problems associated with adverse health impacts of asbestos, alternatives to substitute asbestos, prospects of development of asbestos mining and processing industries in these countries.

These broad discussions were unique as they were initiated and conducted by non-governmental organisations of EECCA countries. Earlier, similar events on "asbestos" problems either were not conducted at all, or were organised by industry representatives or governmental entities.

In the course of these consultations, the range of relevant problem was identified, that are of interest to all stakeholders and are related to the problem of production and use of asbestos and asbestos-containing products.

The following issues were selected for the general discussion:

- asbestos mining and use in the World and in EECCA region;
- survey of situation in the sphere of asbestos production and use in Russia, Kazakhstan and Ukraine;
- management of asbestos-containing waste;
- health impacts of asbestos - national and international data;
- international treaties un the sphere of asbestos management; the role of the Rotterdam Convention; national legislation in the sphere of asbestos management;
- the role of public education, information and awareness raising for addressing chemical security problems in the context of synergy of three international chemical conventions (Rotterdam, Basel and Stockholm conventions).

Prior to the seminars, available information on asbestos production problems was collected. Information kits were produced for participants of seminars and mass media representatives invited to press conferences.

Information kits for participants of these seminars included summary materials on "asbestos" problems, developed by EECCA NGOs (the Chemical Security Program of Eco-Accord Centre - Russia; MAMA-86 Ukrainian National Environmental NGO - Ukraine, "Greenwomen" Information and Analytical Centre - Kazakhstan) in partnership with Women of Europe for the Common Future NGO (the Netherlands).

WHO experts provided their information materials that were used in the course of discussions at the seminars.

Representatives of mass media outlets, who were invited to press-conferences, also were provided information kits with information materials on the problem of asbestos production and use, its environmental and health impacts.

At the base of the discussions' results, the following recommendations were developed.

## CONCLUSIONS AND RECOMMENDATIONS

Analysis of published sources, views of experts and recommendations of international organisations, results of discussions in the course of the seminars allow to make the following conclusions:

- Asbestos (asbestos of all types) was classified by IARC as a 1st group human carcinogen.
- Asbestos is particularly hazardous if inhaled as dust.
- Incidence of asbestos-inducer diseases depends on type and length of asbestos fibres, doses and previous industrial asbestos-processing operations.
- No threshold was identified for carcinogenic effects of chrysotile, therefore its levels in air must be as low as possible.
- Smoking increases asbestos-induced risks of lung cancer.
- Asbestos-induced diseases have long latency periods, as a result, elimination of asbestos application now would result in reduction of asbestos-related mortality only a few decades later.
- Available data on health impacts of asbestos in the EECCA region are extremely limited and cannot provide a complete outlook of asbestos-related problems at the contemporary level of development of the EECCA countries. It is necessary to require allocation of funds for implementation of epidemiological research on health impacts of asbestos in the EECCA region.
- In order to restore social fairness in respect to mesothelioma patients, it is necessary to develop an algorithm of profession-disease dependence, to establish national cancer-registers of mesothelioma cases and to study incidence of the disease in the EECCA countries.
- There are all necessary preconditions in the EECCA region to comply with and to toughen asbestos-handling rules, to replace asbestos by substitutes, namely heat-resistant polymer fibres, carbon and inorganic fibres, ultra-thin synthetic wool. The range of modern industrial substitutes for chrysotile include cellulose, aramide, PVA (polyvinyl alcohol), polypropylene, polyethylene, mineral wool, glass and ceramic fibres. The most common substitutes for asbestos are believed to include aramide fibres, nomex, cellulose. Broad research is needed to analyze cancerogenic risks of this substances for humans in order to guarantee their safety for people.
- The EECCA countries in their sanitary, hygiene and environmental practices do not use the ideology of acceptable risk. However, this ideology would require transition of legislative and executive systems of environmental security management from the concept of "response and correction" (the underlying concept of the "absolute" safety policy) to the concept of "forecast and prevent" - that is the underlying concept of the "acceptable" risk policy. Transition to the latter ideology is absolutely necessary. Sound management decisions are promoted by introduction of economic assessment of potential consequences at the base of

the concept of "costs and benefits. So far, such practices are not broadly applied in the EECCA countries. Therefore, it seems appropriate to countries with major reserves of chrysotile asbestos, that use asbestos and export it, to apply broader in their assessments and actions some key principles that would allow to make sound informed decisions on asbestos-associated health and environment matters.

These principles include:

1. ***Substitution principle***: more active re-orientation of production for use of safe alternatives to asbestos.
2. ***Right to know principle***: members of the general public, workers and local resident at territories under asbestos industry impacts, should be informed on hazardous properties of asbestos, asbestos-induced diseases, asbestos emissions of industrial facilities, asbestos levels in air nearby asbestos plants and in their workplace environments. Such information should be freely accessible and it should be actively disseminated by production facilities, public health bodies and state supervisory bodies.
3. ***Precautionary principle***: data of the WHO experts should be considered as a basis for introduction of measures to prevent risks of asbestos health impacts.

- EECCA countries need to ratify the Rotterdam Convention that allows countries to require information on hazardous properties of certain substances in the PIC list before permitting their import.
- Insufficient control and legislative gaps allow selling of asbestos products without labels warning that asbestos dust causes cancer. It is necessary to include obligatory labeling of asbestos products warning that asbestos is dangerous for health.
- EECCA countries practically do not inform their residents on matters of asbestos health impacts. There are no popular publications on safety measures in the course of handling asbestos-containing products in household settings, on measures to reduce adverse health impact of asbestos-containing dust nearby asbestos mines and asbestos processing plants. It is necessary to initiate broad public information activities, covering the general public and employees of asbestos extraction and processing facilities, seeking to ensure maximal possible reduction of asbestos-induced morbidity in the region and with the goal to eliminate asbestos production and use worldwide.

THE CALL FOR ACTION

**Asbestos: Is a compromise possible?**

No. **The aim is to eliminate application of asbestos-containing materials completely, to replace them by modern safe materials.**

This aim may be achieved only if asbestos production and use would be banned legislatively. As the first step, it is necessary to include asbestos into the list of substances under jurisdiction of the Rotterdam Convention.

The appeal to governments with demands to prevent interference of asbestos industry into the decision-making process of the Rotterdam Convention has been already signed by representatives of 58 NGOs of different countries, including 8 EECCA countries: Azerbaijan, Armenia, Moldova, Russia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan.

Parties of the Convention should make the only sound decision on the basis of credible scientific data and information available on health hazards of asbestos. Millions of people wait for the decision to ban asbestos mining, trade and use of asbestos-containing products.

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