Ban of Asbestos and Management of Asbestos Wastes – Case Study Switzerland

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1 Background and Objectives

Asbestos is a common name given to naturally occurring fibrous minerals (silicates) (Figure 1), which can be divided in two sub-groups: *serpentines, with curly fibres*, and the more hazardous *amphiboles with needle-like fibres*. The only asbestos mineral in the *serpentine* group is *Chrysotile* and this has been used in up to 95% of all asbestos applications. Chrysotile is still being mined mainly in Russia, Kazakhstan, China, Canada, Brazil and Zambia with a total production estimated 2,400,000 tonnes per year. China, Russia and India are probably the major users but in many other countries the relative cheapness of asbestos still prevails over health concerns.

Figure 1: Asbestos (tremolite) silky fibres on muscovite from Bernera, Outer Hebrides. (Source: Aram Dulyan [3])

Asbestos is extremely resistant to fire, heat, acids and many chemicals. Thanks to these and other physical properties of strength, flexibility and high thermal insulation asbestos fibres have been used in a wide range of building and technical applications (Table 1).

It is also their physical properties which present hazards to health. The asbestos fibres break down into fibrils which can, as a result of their very small size, pass deep into the lungs and lodge in the respiratory system. The most dangerous fibers are those that are long (more than 5 µm) and thin (less than 3 µm). Whilst the likelihood of developing an illness depends very largely on the size and nature of the asbestos fibers, and thus varies according to the type of asbestos, the fact is that all types of asbestos are carcinogenic [1], [2].

Exposure to large amounts of asbestos fibres over longer periods, usually during work, can cause lung fibrosis, also called *Asbestosis*. Mesothelioma, a cancer of the protective covering of organs, including the lungs causes the largest number of deaths related to asbestos exposure.

Asbestos containing materials (ACMs) can generally be divided in two categories, asbestos cement (AC) and *asbestos insulating boards* (AIB), or bonded asbestos (fibres are held tightly within the structure) and *unbonded* asbestos (fibres can easily be released). Asbestos was used in more than 3,500 products during the 20th century (Table 1).

Whilst the *amphibole* asbestos types are included in the Rotterdam Convention (Annex III) and the Basel Convention (see Annex I, III und VIII), the most common type Chrysotile asbestos is not banned or listed in any International Convention and there was strong political resistance to proposals to list it during COP5

Bonded asbestos		Unbonded asbestos
Asbestos cement wall panels	Asbestos glazing compounds	Asbestos insulating board panels
Asbestos cement corrugated sheets	Asbestos caulking flange	Asbestos insulating board ceiling tiles
Asbestos cement roof sheeting	Asbestos block- and clutch pads	Asbestos fire doors and panels
Asbestos cement downpipes/gutters	Asbestos tile cement	Asbestos insulation on pipes/lagging
Asbestos cement scabbard tube	Floor adhesive	Asbestos ropes and cloth
Asbestos cement cable and air duct	Asbestos vinyl floor tiles/sheeting	Sprayed asbestos coatings
Asbestos cement containers	Asbestos roofing tar	Loose fill asbestos

Table 1: Asbestos applications

of the Rotterdam Convention in June 2011. For asbestos and asbestos wastes included in Annex I und III of the *Basel Convention* transfrontier movements are only permitted with the prior consent of the exporting, importing and any transit countries.

The enormous variations between the approaches of different countries to asbestos are hard to understand in the light of the long and well documented history of the health and environmental hazards. While some countries have comprehensive laws and guidelines requiring proper removal and disposal of asbestos containing materials other countries are still mining asbestos using heavy duty equipment with little or no health and environmental protection. Furthermore laws and regulations prohibiting amphiboles asbestos like *Amosite* and *Crocidolite*, but which exclude *Chrysotile*, will never solve the global asbestos problem.

A number of countries have banned the use of Asbestos (Table 2) and many industrial countries have remediation programmes for affected buildings and have established good waste management practices.

Algeria	Czech Republic	Iceland	Malta	Saudi Arabia
Argentina	Denmark	Ireland	Mongolia	Seychelles
Australia	Egypt	Israel	Mozambique	Slovakia
Austria	Estonia	Italy	Netherlands	Slovenia
Bahrain	Finland	Japan	New Caledonia	South Africa
Belgium	France	Jordan	Norway	Spain
Brunei	Gabon	Korea (South)	Oman	Sweden
Bulgaria	Germany	Kuwait	Poland	Switzerland
Chile	Greece	Latvia	Portugal	Turkey
Croatia	Honduras	Lithuania	Qatar	United Kingdom
Cyprus	Hungary	Luxembourg	Romania	Uruguay

Table 2: Countries with national asbestos bans (Source: International Ban Asbestos Secretariat, 2012 [5])

2 Approach, Achievements and Results

Switzerland is one of the leading countries for good practice in the management of asbestos. The Ministry of Health and the Swiss Accident Insurance (Suva) surveyed the health risks in the 1970s and based on the assessment the Ministry of the Environment prohibited the application of spray asbestos (Figure 2). This unbonded material contains a higher percentage of asbestos, releases fibres easily and thus poses the greatest health risk. Asbestos containing boards, cardboards (Figure 3), insulating board panels, ropes, and vinyl floor tiles (Figure 4) were also banned. Further assessments of health risks and related diseases in 1990 resulted in a general asbestos ban prohibiting the use of all types of asbestos.

A Directive (EKAS Richtlinie 6503) was established to manage the asbestos legacy (mainly in buildings) and this requires that unbonded asbestos materials must be reported and removed. The Swiss national asbestos guidelines and fact sheets detail the approved removal techniques and associated precautions.

The Ministry of Health also set workplace exposure limits at 10,000 respirable asbestos fibres per cubic meter (m3) of air. No legal limit values were set for indoor air in residential buildings but the Ministry of Health recommends keeping asbestos contamination as low as possible. Concentrations of more than 1,000 respirable asbestos fibres per m3 of air should not be tolerated and the source should be eliminated.

Figure 2: Removal of Sprayed Asbestos (Source: ETI [4])

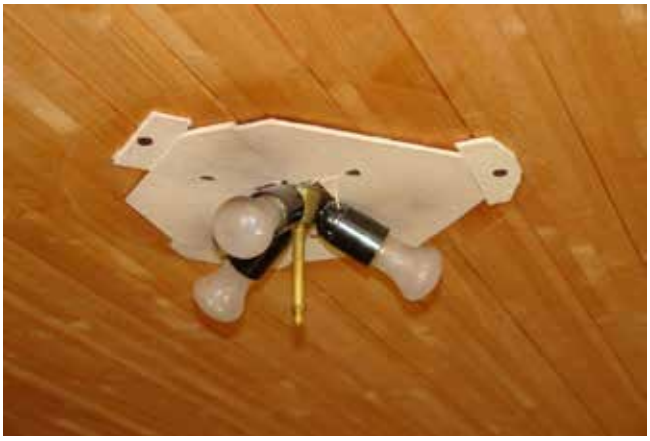

Figure 3: Asbestos cardboard under lamp
(Source: ETI [4])

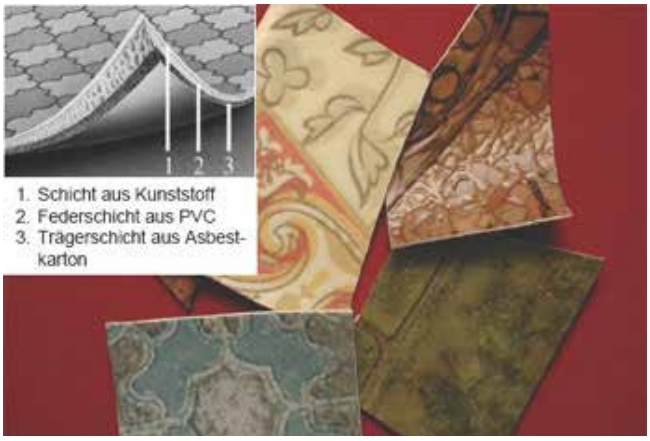

Figure 4: Asbestos cushion vinyl floor tiles/sheeting
(Source: ETI [4])

The Swiss experience shows that only a methodical professional approach with careful planning can guarantee the safe and sustainable removal and disposal of asbestos containing materials:

Survey	Analysis	*Immediate measures (if necessary)*	Planning	Removal	Check effectivness
• Site visit • Sampling	• Analysis • Results • Interpretation of results • Report	• e.g. Removal of particulary dangerous applications	• Definition of goals • Definition of methods • Definition of precaoutions • Adherencet to guidelines	• Removal • Cleaning • Disposal	• Indoor air measurements • Inspection • Approval

The removal of unbonded asbestos containing materials (Figure 2) entails a particularly high-risk and it must be ensured that only suitably qualified and licensed contractors undertake this work. A key issue is the definition and delivery of appropriate precautions to protect worker health and the environment. Any asbestos containing materials which cannot, for whatever reason, be removed must be clearly labelled (Figure 5) for future remediation and appropriate disposal in dedicated landfills.

After unbonded asbestos applications have been removed, or when bonded asbestos products have been broken, cut, damaged or disturbed, indoor air measurements must be carried out before the affected rooms are used again (Figure 6). Only such measurements will indicate the remaining number of fibres in the air and allow an assessment of the effectiveness of the works and clean-up.

Figure 5: Labelling of asbestos containing materials
(Source: ETI [4])

Figure 6: Indoor measurement after clean up in a school building
(Source: ETI [4])

3 Conclusions and Lessons Learnt

The lessons learnt from the Swiss experience can be summarised as follows:

- Professional management of asbestos saves lives.
- All asbestos types should be addressed within a comprehensive regulative frame.
- In the light of the clear health risks a ban on imports, exports, production and use of all types of asbestos is recommended. If stakeholders require exemptions a full cost/benefit analysis should be performed taking into account the external costs and provision should be made for future clean up by a suitable bond or secure financial provision.
- To manage the legacy of asbestos products still in use, particularly in buildings, a legal framework should be established which requires the reporting and removal of those asbestos materials presenting a direct threat to health and in particular unbonded asbestos. Other asbestos containing materials may remain in use until repair or reconstructions work is required or the building is demolished. At this time the owner of the building must guarantee the safe management of any remaining asbestos.
- Professional removal techniques and precautions should be clearly regulated in a national asbestos directive supported by guidelines and fact sheets for specific applications.
- Removals of asbestos materials should always be supervised by appropriately qualified experts.
- After asbestos removal activities, indoor air quality should be measured to assess the effectiveness of the work and to issue certificates of safe completion.

4 Guidance and Information Materials Available

US Department of Labor information on asbestos

US EPA information on asbestos

Wikipedia basic overview on asbestos

World Health Organization (WHO), International Agency for Research on Cancer (IARC) Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C, 2012

World Bank: Good Practice Note Asbestos: Occupational and Community Health Issues

International Ban Asbestos Secretariat

Asbestos legislation EU:

Directive 2009/148/EC of the European Parliament and of the Council of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (codified version)

Commission Directive 1999/77/EC of 26 July 1999 adapting to technical progress for the sixth time Annex I to Council Directive 76/769/EEC on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (asbestos)

Directive 2003/18/EC of the European Parliament and of the Council of 27 March 2003 amending Council Directive 83/477/EEC on the protection of workers from the risks related to exposure to asbestos at work

5 References Cited

[1] World Health Organization (WHO), International Agency for Research on Cancer (IARC), Volume 100C, 2012 http://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C.pdf#page=219

[2] U.S. Department of Health and Human Services, Toxiological Profile of Asbestos, September 2001 http://www.atsdr.cdc.gov/toxprofiles/tp61.pdf

[3] Aram Dulyan http://en.wikipedia.org/wiki/File:Asbestos_with_muscovite.jpg

[4] ETI Switzerland http://www.eti-swiss.com/index_e.html

[5] International Ban Asbestos Secretariat http://www.ibasecretariat.org