

## Press release

Dübendorf / St. Gallen / Thun, July 7, 2006

29th Empa Science Apéro

### **Treacherous Asbestos – the hidden dangers**

**Because of its versatile properties, Asbestos was used in many building materials for decades. However, since it was determined that the fire resistant fiber is dangerous to health, Asbestos is now banned. But the built in material did not simply disappear because of this ban. In the course of reconstruction work, one unexpectedly comes upon Asbestos quite often, even today. At the end of June, three experts discussed in Empa's Science Apéro the dangers of Asbestos.**

Asbestos was considered a "wonder material" for a long time. It does not burn, it is resistant to many aggressive chemicals, it insulates heat, cold and noise, and can be easily and inexpensively manufactured. This unique mix of characteristics made Asbestos a desired material in industry and technology for a long time. However, since it became known that inhaled Asbestos dust is harmful to health, Switzerland in 1989 banned the use of Asbestos. But this ban did not all of a sudden bring about the disappearance of Asbestos. Today the problems with Asbestos concern themselves with overcoming the still wide-spread sites with building materials containing Asbestos.

#### **A natural fiber mineral**

"Asbestos surpasses similar materials like rock or glass wool not only in its ability to withstand heat, but also because of the elasticity and tensile strength of its fibers, qualities which enable the production of fire resistant fabrics", Empa's Michael Romer praised the positive attributes of Asbestos. Already in ancient times naturally occurring fibers in certain petrified silicates were greatly valued for their wondrous qualities. The Greeks called this material *asbestos* which means imperishable or indestructible, and made out of it durable lamp wicks and fire resistant textiles. During the last century, millions tons of Asbestos were mined each year worldwide, and were used in the production of a variety of technical products. Altogether there are six different types of Asbestos out of which *white Asbestos* (Chrysotil) alone is responsible for more than 90% of Asbestos use and production. Besides

Chrysotil, only Krokydolith (*blue Asbestos*) and Amosit (*brown Asbestos*) have some commercial value.

### **The perils with Asbestos products**

Asbestos was mainly used in the production of building materials. Although they may have been used in construction many years ago, one can still come across Asbestos materials even today because of their well known longevity. And that is precisely where the peril lurks, because, if the Asbestos containing material is damaged, Asbestos fibers can become loose and inhaled into the lungs. A higher health risk is then present especially in the demolition and reconstruction of older buildings. The quantity of Asbestos presence in a product is not the sole criteria for an increased health risk. The condition and kind of bonding of the Asbestos into the enclosing material may also count as factors. According to Empa expert Romer, "especially problematic are lightly compacted isolation building materials like asbestos card board, or Asbestos containing light weight construction panels in which Asbestos particles are poorly embedded. Even minor mechanical pressures can cause the release of large quantities of the feared micro fibers. In contrast to these as well as to sprayed asbestos are products with well fixed Asbestos such as fiber cement or the old balcony flower containers, which are notably less problematic so long as no incorrect hammering, sawing or drilling is done on them.

When renovating or demolishing a building containing Asbestos, experts must prepare a plan taking into account the possibility of releasing Asbestos from the start of the project, and at each step of progress. Frequently, however, the existence of Asbestos in a building is unknown, or one has only mere momentary suspicions. In such circumstances, material analysis or so called "Building Checks" should be the first steps of a correct handling of Asbestos wastes in order to prevent health hazards. When experts are undecided about the possible impact of Asbestos in a given project, they can turn to Empa which offers such evaluative services.

### **The danger inherent in micro fibers**

To Martin Ruegger, industrial health physician and SUVA expert, this much is certain: The real danger is the released and inhaled Asbestos micro fibers. Their chemical stability and long life are, from a medical view point, the main cause for the observed diseases. And their size makes them especially dangerous: with a diameter of only a fraction of a human hair and a length of more than five micro meters these fibers can penetrate deep into lung tissues and therefore they are known as LAF- which stands for Lung Conventional Asbestos Fibers. Once such fibers get lodged in lung tissues the body cannot remove, eliminate or

otherwise make them harmless, because of their resistance to chemicals and their form (long fibers).

### **Dramatic long-term consequences**

Depending on the total amount of inhaled Asbestos micro fibers, these can possibly accumulate in the lungs over the years, and may eventually lead to chronic changes in the tissues. There are many symptoms directly related to the inhaling of Asbestos such as Pleurisy plaques, Asbestos pneumoconiosis, (Asbestosis), lung cancer and malignant Mesotheliom. The latent period of these diseases, that is the time after the inhaling of the fibers and before the appearance of the first symptoms, can vary between 15 to 45 years, and is therefore comparatively long, according to Ruegger. Although, according to SUVA, since the ban on Asbestos took effect, the number of new cases of Asbestosis in Switzerland fell to about ten per year, the number of newly reported cases of malignant cancers – arising from the consequences of past exposure – rose last year to about 70.

### **Lower limits**

The knowledge about the dangers of Asbestos fibers forced the Legislature to intervene. Since 2002, there exist in Switzerland quite low limits for the concentration of fibers capable of penetrating into our lungs per cubic meter of air (LAF/m<sup>3</sup>). In living rooms or rooms occupied constantly, such as school rooms, measurements greater than 1000 LAF/m<sup>3</sup> should not be tolerated. The most effective prevention, according to the physician, is not to expose oneself to any Asbestos fibers, but of course, this is not always possible.

### **Extensive and costly renovation of buildings containing Asbestos**

Quite often while renovating older buildings one unexpectedly finds Asbestos. Roger Acherman of the ARGE Acherman Ltd. in Dubendorf, a company specializing in the removal of Asbestos, suggests how one should proceed when that happens. First, one must follow the many prescribed regulations: notifying the proper authorities, preparing appropriate concepts for rehabilitation, security and waste disposal as well as monitoring and control measurements during and after the actual rehabilitation work. "First and foremost is the safety of all workers and experts on the construction site", claims Acherman. In order to accomplish this SUVA enacted certain rules: specialized training, hermetically sealing off the clean-up area, de-airing with decompression, personal air locks, special protective clothing with an external breathing apparatus as well as independent monitoring measures should ensure the highest standard of security.

Dubendorf's "disposer of Asbestos", will be busy for a while. When one considers the great

number of Asbestos containing goods produced in Switzerland in the last decades, unexpected finds of hidden Asbestos are only a question of time.

**Author**

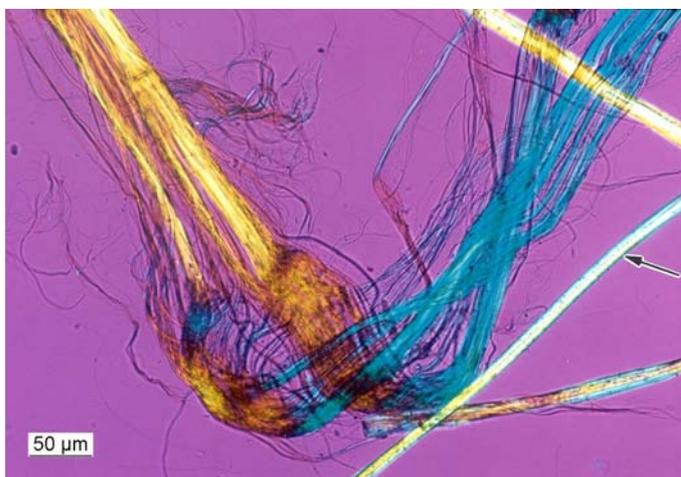
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Bunch of fibers of Chrysotil in the polarizing light microscope



Lightly compacted isolation building materials: Light weight construction panel (below) and Asbestos card board (2x above)