

## **Responsibility Of Local Governments For Asbestos Control In Buildings To Be Destroyed**

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### **Abstract**

When materials containing asbestos are damaged, they release asbestos fibers into the air that cause serious diseases. These diseases do not appear suddenly with the first exposure, but develop over time. For this reason, treatment is late and there is nothing that can be done.

Although the production of asbestos is banned in most countries, materials containing asbestos products are still used in many areas. Employees who repair and maintain these materials are at greater risk than other people. Asbestos, which has been used especially in the construction sector, has started to become a problem within the scope of urban transformation projects or with the destruction of buildings as a result of a natural disaster such as an earthquake.

The existence of the "Asbest free" certificate, which must be obtained for the demolition of buildings suspected to contain asbestos, and the "asbestos survey report" showing where asbestos is found in the building should be subject to strict control by general and local governments. In particular, workers working during the maintenance

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and repair of buildings built before 2000 must have an asbestos removal worker certificate. It is very important to take samples from the suspected material and to examine it in an accredited laboratory.

In this study, 10 provinces in Turkey were selected as examples and the inspection of the asbestos survey report of the buildings to be demolished from 175 district municipalities in total was investigated. According to the results of the research, it was determined that in the asbestos inspection carried out by the municipalities, the inspection was good in 8 districts, the inspection was moderate in 12 districts and the inspection was weak in the remaining 155 districts.

At the end of the study, it was suggested that general and local governments should increase asbestos inspections in terms of public and environmental health, collect waste asbestos in hazardous waste collection centers after taking samples in the existing buildings, and use dust suppression methods during the repair and demolition of buildings with asbestos.

**Keywords:** *Asbestos, Asbest Free, Asbestos Survey Report*

## Introduction

Tasteless, no odor, durability, high flexibility, non-evaporation, insoluble in water, non-degradable fibers, low electrical/thermal conductivity, chemical/bacterial resistance, non-flammable; Features such as suitable friction/wear values and desired acoustic properties make asbestos an important material group in industries such as construction (cooling and heating, tile and ceramic), cement industry, automotive (brakes and car clutches) and insulation (floor and ceiling covering) <sup>1</sup>.

Asbestos crystals are different from other minerals. Asbestos fibers, magnified 2000 times, are in the form of needles or wavy bristles and are as strong as steel wire. The fiber surface area is also highly absorbent, making it an ideal component for the manufacture of filter products and as an "active filler" component in the manufacture of products such as cement, vinyl floor tiles, paints and plastics.

There are two main groups or classes of asbestos minerals known as serpentines and amphiboles. It is divided into two groups due to its crystal structure. While serpentine minerals have a stratified or layered structure, amphibole minerals have a chain-like structure. There are six widely recognized types of asbestos minerals; chrysotile, amosite, crocidolite, actinolite, tremolite and anthophyllite (Figure 1).

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<sup>1</sup>[https://www.hsa.ie/eng/Publications\\_and\\_Forms/Publications/Chemical\\_and\\_Hazardous\\_Substances/Asbestos\\_Guidelines.pdf](https://www.hsa.ie/eng/Publications_and_Forms/Publications/Chemical_and_Hazardous_Substances/Asbestos_Guidelines.pdf)

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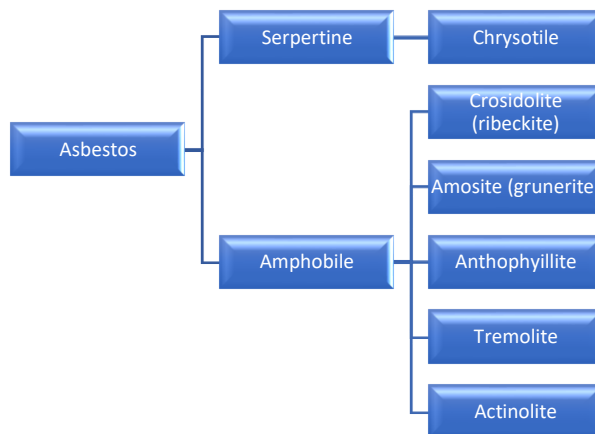


Figure 1. Types of Asbestos<sup>2</sup>

Only the first three are widely produced commercially. Chrysotile, which is white in processed form, is preferred because of its high tensile strength and flexibility. It is widely used in the manufacture of insulation products. Amosite, also known as brown asbestos, belongs to the amphibole group. An important feature of amosite is that it is more difficult to wet than other asbestos minerals. Crocidolite or blue asbestos, which is less used and causes more health problems, is also an amphibole. Only in South Africa, crocidolite is incredibly strong and is characterized by thick, tough fibers. It is also highly resistant to acids and weather conditions. Anthophyllite, Actinolite and Tremolite minerals are rare and have little commercial value.

Asbestos levels in windswept soil may be higher near collapsed buildings covered with asbestos cement or a landfill where the asbestos has broken down or is not properly sealed.

<sup>2</sup> <https://www.asbestos.com/asbestos/types/>

In particular, airborne asbestos levels that cause lung disease depend on several factors. The most important ones are (1) how long they have been exposed, (2) how long they have been exposed, and (3) whether they smoke<sup>3</sup>. Therefore, eating, drinking and smoking should be avoided in places where asbestos is present, because smoking increases the risk of asbestos-related diseases by 30 times <sup>4</sup>. Many countries around the world have banned the production and consumption of asbestos <sup>5</sup>. There are various studies around the world about asbestos and its carcinogenicity. You can also be exposed to asbestos by drinking asbestos fibers found in water. In consequence of asbestos does not dissolve in water, the fibers pass into the water due to abrasion from natural deposits or waste asbestos piles, and filtration through asbestos-cement pipes or asbestos filters carrying drinking water. The health effects of swallowing asbestos are unclear. However, it is reported that the death rates of some groups of people exposed to asbestos fibers in drinking water are higher than the death rates due to esophageal, stomach and intestinal cancer.

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<sup>3</sup> Harding A-H, Darnton A, Wegerdt J, Mcevenny D (2009) Mortality among British asbestos workers undergoing regular medical examinations (1971–2005). *Occup Environ Med* 66:487–495

<sup>4</sup> Pastuszka JS (2009) Emission of airborne fibers from mechanically impacted asbestos-cement sheets and concentration of fibrous aerosol in the home environment in Upper Silesia, Poland. *J Hazard Mater* 162:1171–1177

<sup>5</sup> Buck, B. J., Metcalf, R. V., Mclaurin, B. T. (2019). Naturally-Occurring Asbestos and Increased Urbanization in Clark County, Nevada. *Geological Society of America Abstracts with Programs*, 51(5), 1-1.

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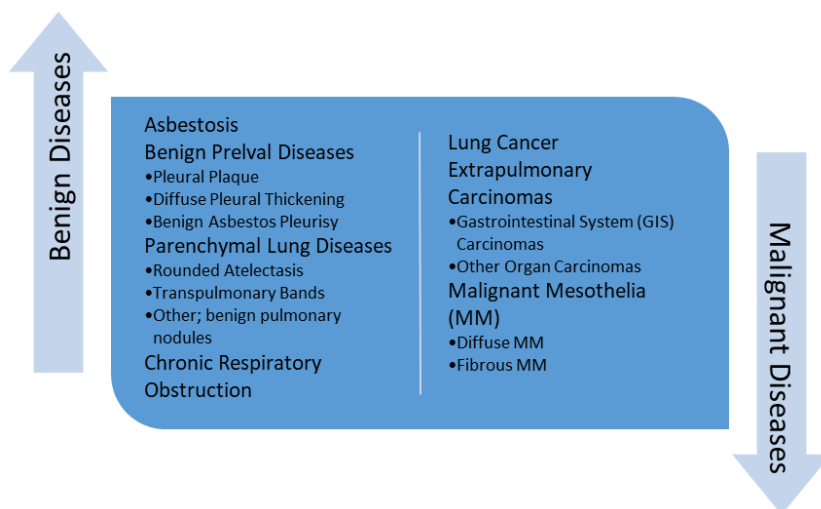


Figure 2. Benign and malignant diseases caused by asbestos<sup>6</sup>

Symptoms of asbestos-related diseases include breathing difficulties and "scarring" on the lung that can be detected by x-ray. The risk of lung cancer and mesothelioma increases with the number of fiber inhaled. The risk of lung cancer and mesothelioma increases with the number of fiber inhaled. Symptoms of these diseases usually do not appear until about 20 to 30 years after the initial exposure to asbestos. Therefore, records should be kept for 40 years after exposure ends (Regulation On Health and Safety In Working with Asbestos, 2013).

### Detection Of Materials Containing Asbestos

If a material contains asbestos or not, if it's not labeled, you can't tell just by looking at it. If asbestos is suspected, the material should be treated as if it contains asbestos and have it sampled and analyzed by a qualified professional. If sampling is done incorrectly, it can be much

<sup>6</sup> Henderson DW, Leigh J. The history of asbestos utilization and recognition of asbestos-induced disease. In: Dodson RF, Hammar S, editors. Asbestos: risk assessment, epidemiology and health effects. 2nd ed. Boca Raton: CRC Press; 2017. p. 1–27

more dangerous than leaving the material alone. For this reason, the material that is in good condition and will not be disturbed should be left to its own devices. Only damaged or breakable materials should be sampled. Anyone sampling asbestos-containing materials should have as much knowledge as possible about asbestos handling prior to sampling and should at least follow the following procedures <sup>7</sup>:

1. No one else should be in the room while sampling is being done.
2. Disposable gloves are worn or hands are washed thoroughly after sampling.
3. All heating or cooling systems are switched off to minimize the spread of released fibers.
4. When taking samples from the material, it should not be cut more than necessary.
5. A plastic sheet is placed on the floor below the area to be sampled.
6. To reduce the release of asbestos fibers, the material is wetted using a fine water mist containing a few drops of detergent.
7. Using a small knife or other sharp object, carefully cut a piece from the entire depth of the materials. The part is placed in a clean container (for example, a 35 mm can of film, a small glass or plastic bottle, or a high-quality resealable plastic bag).
8. After the sample enters the container, it is tightly closed.
9. The container is labeled and the label clearly states when and where the sample was taken (Figure 3).

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<sup>7</sup> Frank AL, Joshi TK. The global spread of asbestos. *Ann Global Health*. 2014; 80:257–62

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10. The remaining part of the sampled material is patched with duct tape to prevent fiber release.
11. The sample is sent to an accredited laboratory authorized for analysis.
12. Asbestos wastes generated as a result of dismantling are sent to licensed hazardous waste intermediate storage facilities by vehicles with hazardous waste transportation license



Figure 3. Packaging of asbestos containing material<sup>8</sup>

### Primary and Secondary Exposure

Brittle asbestos materials are easy to break or shatter by hand. For example, old pipe insulation with asbestos and asbestos-contaminated talcum powder are dangerous because they can easily release fibrous dust into the air. Unbreakable asbestos materials, such as asbestos cement sheets and vinyl asbestos tiles, are durable and will securely trap asbestos fibers as long as these products do not deteriorate. Cutting, scraping or shredding the product can release the fibers. Asbestos builds up in the body with every exposure, and there is no known way to reverse the damage it causes. People living near naturally occurring

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<sup>8</sup> [https://www.kitsapgov.com/pw/Documents/Asbestos\\_Disposal.pdf](https://www.kitsapgov.com/pw/Documents/Asbestos_Disposal.pdf)

asbestos deposits should avoid digging into soil that may be contaminated<sup>9</sup>.

Primary exposure to asbestos happens to people who work with asbestos. This type of exposure was common among men in the 20th century because they were more likely to be employed in workplaces that used asbestos products. Secondary exposure to asbestos is more common among women and children. Before strict regulations were enacted in the 1970s, it was common for asbestos workers to unknowingly bring home asbestos with their work clothes, shoes, and tools.

Secondary asbestos exposure is just as dangerous as primary exposure. Any amount of asbestos exposure can cause serious health effects. Repeated, long-term secondary exposure causes the same diseases and cancers as primary exposure, including mesothelioma. Secondary asbestos exposure is also called domestic exposure, indirect exposure, secondary exposure.

Employers must now provide opportunities for workers to change contaminated clothing before going home. Shower facilities are also required so that workers can clean their skin and hair of asbestos before going home. In addition, special laundry services should be provided to workers in order to properly clean contaminated work clothes. Workers should generally not have access to these specialized laundry services and should not attempt to wash their own contaminated clothing<sup>10</sup>.

### **Where Asbestos Can Be Found in Residential Buildings**

For landlords, the risk of exposure to the deadly substance increases during renovations or repairs. If planning a renovation on a home built

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<sup>9</sup> ACPMA. Production data of member companies. Available at: <http://www.acpma.com/production-data-of-member-companies.html>. Accessed October 14, 2014

<sup>10</sup> Virta RL. Worldwide asbestos supply and consumption trends from 1900 through 2003. USGS Circular 1298. 2003.

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before 1990, it is wise to assume that asbestos is present. Places where asbestos can be found in homes include <sup>11</sup>(Figure 4):

1. Vermiculite insulation in the attics of homes built between the 1920s and the late 1980s may have been contaminated with asbestos.
2. Asbestos can be found in many different forms in the ceilings of homes. Most older homes contain "popcorn ceilings" created with asbestos-containing spray paint as far back as the 1980s.
3. Until the 1980s, some wall tiles and textured paints contained asbestos fibers.
4. Asbestos Fibers added strength to different pastes used in homes, especially on the windowsill, and increased their fire resistance.
5. The walls and floors around wood stoves can be protected with asbestos paper, cardboard or cement boards. Faux fireplace embers, logs and ashes may contain the substance.
6. Older garages and sheds were built with asbestos wall and roof panels and tiles and asbestos pipe insulation. There is a risk of exposure to asbestos there, as it was used in the brakes, seals and clutches of vehicles parked in garages until very recently.
7. In some older homes built before the 1980s, exterior tiles and stucco were made of asbestos cement to strengthen them, increase durability, and provide fireproofing to the homes.

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<sup>11</sup> US Environmental Protection Agency, 1990. Managing Asbestos in Place: A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials. EPA Pub. No. 20T-2003.

8. Drywall used to build the walls of homes normally does not contain asbestos. However, the taping, texturing, coating, and joint compound used on and between drywall did not contain asbestos until 1979.
9. Asbestos vinyl floor tiles and the asbestos adhesive that attaches them to the floor are often found in older homes. These tiles were inexpensive, durable, and easy to install, but if they're broken, sanded, drilled, or dug, they pose a risk to homeowners today.
10. Asbestos insulation is used in ventilation and around steam pipes connected to boilers, furnaces and similar equipment. Sometimes cooling/heating/air conditioning lines were wrapped in asbestos insulation.
11. Asbestos cement pipe was used in the water and sewer lines between the houses and the street and along the main street line. Deteriorated pipes can carry the released asbestos fibers into the home's drinking water

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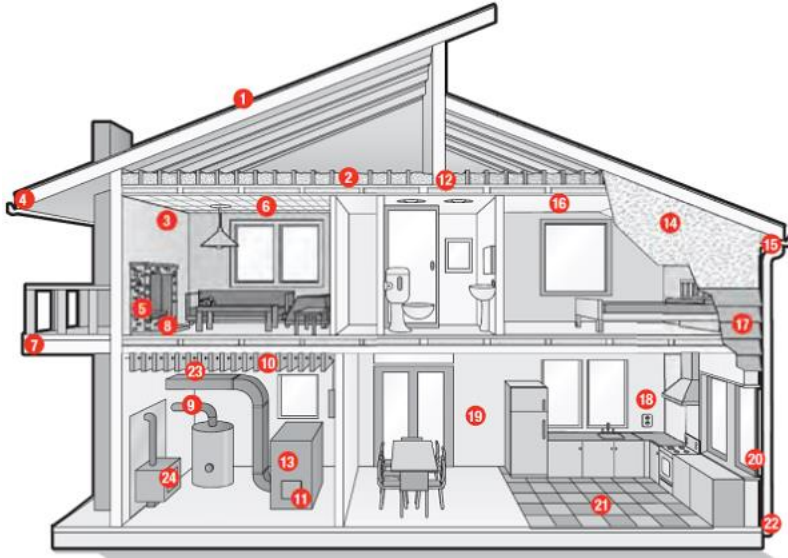


Figure 4. Asbestos-containing parts of buildings<sup>12</sup>

Asbestos-containing numbered sections in buildings in Figure 6 are:

- 1) Roof felt, 2) Loose, blown-in insulation such as vermiculite, 3) Roof Gutters, 4) Artificial fireplace logs and ashes, 5) Acoustic Tiles, 6) Underfloor Coating, 7) Asbestos felt under the fireplace, 8) Pipe insulation, 9) Main Panel and Fuse Box, 10) Door and Gasket Covers, 11) Recessed lighting back support, 12) Boiler and Furnace Insulation, 13) In The Outer Coating, 14) Under eaves plates, 15) Textured or Embossed Walls and Ceilings, 16) Asbestos Cement Board Coating, 17) Sockets and switches, 18) Drywall Filler, 19) Window Putty, 20) Floor, 21) Inner Pipes, 22) Insulation in electrical wires, 23) Heat Reflector For Wood Stove

<sup>12</sup> <https://www.insaport.com/makale/yuksel-kaya/asbest-hakkinda-bilmeniz-gerekenler-nelerdir/>

Visual inspection of the home is often not sufficient to determine whether it contains asbestos. Instead, samples of suspected asbestos materials should be sent to a certified laboratory for analysis<sup>13</sup>. Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM) are two approved asbestos analysis methods. Although the Environmental Protection Agency (EPA) provides detailed guidance on how to collect samples that may contain asbestos, the American Lung Association recommends hiring a certified asbestos specialist instead to take any samples <sup>14</sup>.

The method used to combat asbestos in the home depends on where the asbestos is found, the condition of the material, and whether it is brittle. Brittle asbestos crumbles easily. Non-brittle asbestos binds more tightly with another material and its fibers cannot be airborne unless sanded or cut <sup>15</sup>. In some cases, materials containing asbestos can be repaired or isolated rather than removed. For example, small tears in pipe insulation can be repaired<sup>16</sup>. Asbestos material in good condition can be insulated from potential damage using a robust, airtight barrier. Encapsulators are used on materials containing asbestos sprayed on walls and ceilings.

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<sup>13</sup> <https://www.epa.gov/asbestos/learn-about-asbestos#effects>

<sup>14</sup> C Yoon, et al. Indoor air quality differences between urban and rural preschools in Korea Environ. Sci. and Pollut. Res., 18 (2011), pp. 333-345

<sup>15</sup> A literature review of Australia and overseas studies on the airborne asbestos fibres from building materials as a result of weathering and/or corrosion, Australian Government Australian Safety and Compensation Council (2008)

<sup>16</sup> P Lajoie, et al. Asbestos Fibres in Indoor and Outdoor. The Situation in Quebec. Sub-committee on Exposure Measurement, Institut national de santé publique Québec, 9 (2003)

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Encapsulants are materials applied in liquid form to provide a seal against the release of asbestos fibers<sup>17</sup>.

### **Asbestos Survey Reports**

Asbestos researches are carried out in order to make a risk assessment by determining asbestos material. Surveys are carried out by experienced personnel, visually controlled. During the survey, appropriate material samples are taken for analysis.

Due to asbestos can occur in different forms and in different places, and there is no tool to detect asbestos, it is never possible to guarantee the presence of asbestos everywhere. It may be asbestos where there is limited access and hidden behind walls or other structures. Therefore, the construction plans will be of great help to the researching consultants<sup>18</sup>.

On the strength of the Law No. 6306, a circular was sent by the Provincial Directorates of Environment and Urbanization to the district municipalities for the preparation of asbestos and hazardous materials inventory reports for the buildings to be demolished. According to this circular, an survey report is required for hazardous materials such as asbestos, fluorescent, lead and mercury belonging to buildings that will

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<sup>17</sup> A Short Guide to Managing Asbestos in Premises  
<http://www.hse.gov.uk/pubns/indg223.pdf>

<sup>18</sup> Lemen, R. A. (2006). Epidemiology of asbestos-related diseases and the knowledge that led to what is known today. Asbestos, Risk Assessment, Epidemiology, and Health Effects, 201-308.

be demolished. Buildings containing asbestos to be remodeled must be allowed to be modified.

Asbestos research should be carried out using international guidelines (eg HSG 264) and sections that may pose asbestos hazard should be marked as a result of the research. Afterwards taking samples from these sections, examinations are made in the authorized laboratory using Scanning Electron Microscope (SEM) and Energy Dispersive Spectrometer (EDS), and the presence of asbestos is checked<sup>19</sup>.

The feature of this microscope is that high-energy electrons interact with the samples to form electron and photon signals<sup>20</sup>. As a result of processing the electrons collected by the detector with the microscope software, images are obtained. In addition, elements are mapped with the EDS detector (Figure 9).

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<sup>19</sup> Cossio R, Albonico C, Zanella A, Fraterrigo-Garofalo S, Avataneo C, Compagnoni R, Turci F. 2018. Innovative unattended SEM-EDS analysis for asbestos fiber quantification. Talanta.

<sup>20</sup> <https://www.epa.gov/asbestos/information-owners-and-managers-buildings-contain-asbestos>

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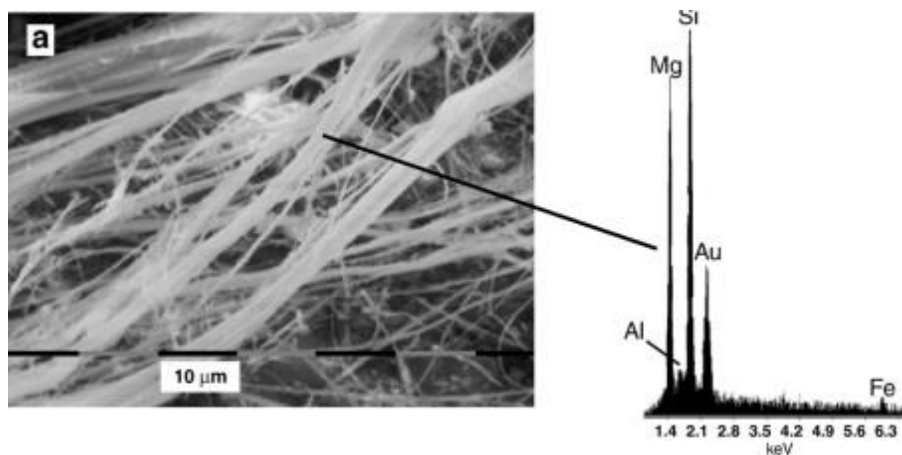


Figure 9. SEM images (a) and EDS spectra of asbestos minerals (chrysotile)<sup>21</sup>

A risk assessment process has been developed within the Health and Safety Manager, HSG 264, that takes into account brittleness, condition, surface treatment and asbestos type factors, giving values to each of the factors allowing you to calculate a key risk assessment.

According to the results and the risk assessment, the person who took the samples, the date, the places where the sample was taken, the general images of the building equipment, where the asbestos is or is not found are reported in detail with photographs (Figure 10)

<sup>21</sup> Dellisanti, F., Rossi, P. L., & Valdrè, G. (2009). Remediation of asbestos containing materials by Joule heating vitrification performed in a pre-pilot apparatus. *International Journal of Mineral Processing*, 91(3-4), 61-67.

**Main - Ground Floor - Warehouse - 005-A - Location**

Area 5 of 21

|  | Building Unit | Floor        | Location  | Location Number |
|-----------------------------------------------------------------------------------|---------------|--------------|-----------|-----------------|
|                                                                                   | Main          | Ground Floor | Warehouse | 005-A           |
|                                                                                   | Area          |              |           | Area Accessed   |
|                                                                                   | Location      |              |           | Yes             |
|                                                                                   | Area Comments |              |           |                 |

The area comprises of a corrugated cement sheet roof with fibre glass light sections and fixed fibreboard ceiling panels, block and brick walls, cement corrugated wall panelling at high level behind fixed fibreboard wall panels, concrete floor, bare RSJ's, metal doors and frames, concrete door reveals, metal roller shutter and housing, no access internally to plant/equipment and electric boxes/units.

**Main - Ground Floor - Warehouse - 005-A - Location**

Inspection 8 of 23

|  | Sample Reference (Type) | Material                  | Item                      | Ease of Access   |
|-----------------------------------------------------------------------------------|-------------------------|---------------------------|---------------------------|------------------|
|                                                                                   | P-308345/S-015 (Sample) | Cement product            | Corrugated sheeting       | Difficult access |
|                                                                                   | Product Type            | Surface Treatment         | Asbestos Type             | Condition        |
|                                                                                   | Asbestos cement         | Asbestos cement           | Chrysotile                | Low Damage       |
|                                                                                   | Extent                  | Material Assessment Score | Priority Assessment Score | Total Score      |

100 m2      4      5      9

**Recommended Action**  
Manage

**Sample Comments**  
Corrugated cement wall panelling visible internally to all walls at high level fibreboard wall panelling.

**Main - Ground Floor - Warehouse - 005-A - Location**

Inspection 9 of 23

|  | Sample Reference (Type) | Material                  | Item                      | Ease of Access   |
|-----------------------------------------------------------------------------------|-------------------------|---------------------------|---------------------------|------------------|
|                                                                                   | P-308345/S-016 (Sample) | Cement product            | Corrugated sheeting       | Difficult access |
|                                                                                   | Product Type            | Surface Treatment         | Asbestos Type             | Condition        |
|                                                                                   | Asbestos cement         | Asbestos cement           | Chrysotile                | Low Damage       |
|                                                                                   | Extent                  | Material Assessment Score | Priority Assessment Score | Total Score      |

180 m2      4      5      9

**Recommended Action**  
Manage

**Sample Comments**  
Corrugated cement roof sheets visible internally behind fibreboard ceiling panels.

Figure 10. Asbestos Survey Report<sup>22</sup>

## Findings And Discussions

In this study, as an example, 10 provinces (Adana, Ankara, Antalya, Elazig, Erzurum, Istanbul, Kocaeli, Mersin, Rize, Sinop) and 175 district municipalities where urban transformation was or will be made were investigated whether they wanted asbestos survey reports related to the presence of asbestos in the buildings before demolition and asbestos control has been done.

175 district municipalities belonging to 10 provinces taken as an example are divided into three groups. In Table 1, municipalities that completely control the Asbestos survey report from the buildings where urban transformation is made or will be made are shown as low risk (Green), partially controlling municipalities as medium risk (Orange), and municipalities that do not control as high risk (Red). In addition,

<sup>22</sup> <https://dmgasbestos.co.uk/surveys/>

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Table 1 also indicates the number of affected populations, as there is exposure to asbestos in building demolitions.

Table 1. Asbestos inventory report research of municipalities

| Province<br>s | Number<br>of<br>Districts | Risk Status |        |      | Affected Population |           | Total      |
|---------------|---------------------------|-------------|--------|------|---------------------|-----------|------------|
|               |                           | Low         | Medium | High | Men                 | Women     |            |
| Adana         | 15                        | -           | -      | 15   | 1 127 516           | 1 131 202 | 2 258 718  |
| Ankara        | 25                        | -           | -      | 25   | 2 805 877           | 2 857 445 | 5 663 322  |
| Antalya       | 19                        |             |        | 19   | 1 281 943           | 1 266 365 | 2 548 308  |
| Elazığ        | 11                        |             |        | 11   | 291 461             | 296 499   | 587 960    |
| Erzurum       | 20                        |             |        | 20   | 378 661             | 379 618   | 758 279    |
| İstanbul      | 39                        | 7           | 12     | 20   | 7 750 836           | 7 711 616 | 15 462 452 |
| Kocaeli       | 12                        |             |        | 12   | 1 009 533           | 987 725   | 1 997 258  |
| Mersin        | 13                        | 1           | -      | 12   | 933 368             | 935 387   | 1 868 755  |
| Rize          | 12                        | -           | -      | 12   | 172 469             | 171 800   | 344 359    |
| Sinop         | 9                         | -           | -      | 9    | 107 689             | 108 771   | 216 460    |

In the research, it was determined as low risk because all buildings to be demolished in 7 district municipalities (Şişli, Kağıthane, Bağcılar, Beşiktaş, Kadıköy, Ataşehir, Maltepe) out of 39 districts of İstanbul province, which were taken as an example and whose population was 15 462 452, were fully inspected. In 12 district municipalities (Silivri, Büyükçekmece, Avcılar, Eyüp, Sarıyer, Sultangazi, Esenler, Zeytinburnu, Beyoğlu, Üsküdar, Ümraniye, Tuzla) all buildings to be demolished were determined to be risky because asbestos inspection was carried out at a moderate level. In the remaining 25 district municipalities (Çatalca, Arnavutköy, Beylikdüzü, Esenyurt, Başakşehir, Küçükçekmece, Bakırköy, Bahçeli houses, Bayrampaşa, Gaziosmanpaşa, Fatih, Beykoz, Çekmeköy, Sancaktepe, Sultanbeyli, Kartal, Pendik, Şile, Adalar, Güngören) asbestos inspection was found to be unsafe and was identified as risky.



# RESPONSIBILITY OF LOCAL GOVERNMENTS FOR ASBESTOS CONTROL IN BUILDINGS TO BE DESTROYED

## MERSİN İLÇE BELEDİYELERİNDE ASBEST DENETİM HARİTASI

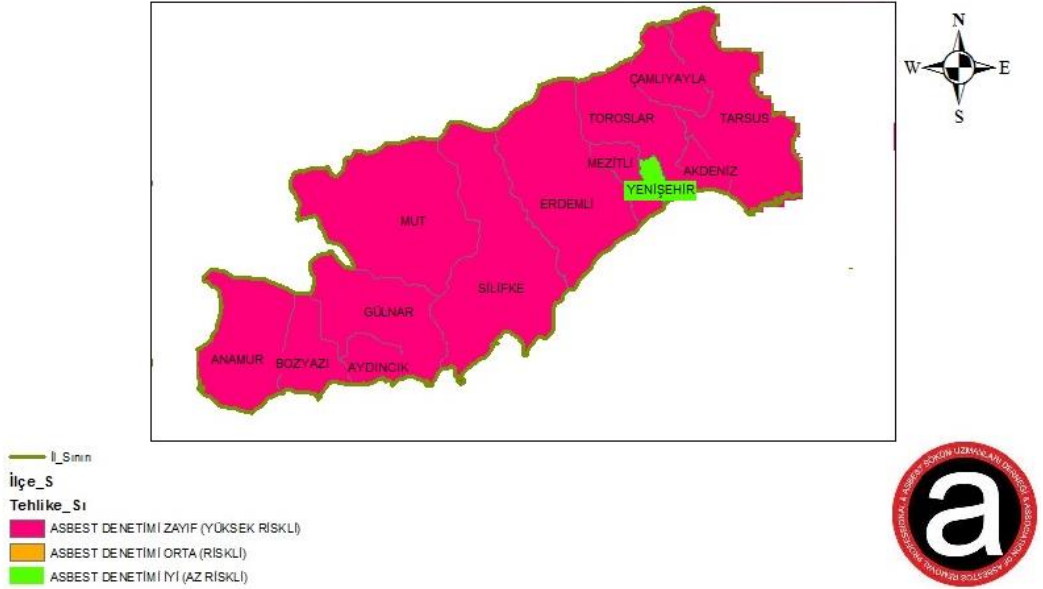


Figure 12. Asbestos Inspection Status Map of Mersin Province

## Conclusion

Detection of the presence of asbestos-containing materials in buildings that are at the time of demolition, and not scattering and removing asbestos fibers is an issue that needs attention both for people living in the surrounding area and for employees. Municipalities are obliged to request an asbestos inventory report and inspect them from the buildings that are decided to be demolished in order to protect them from the damages of asbestos.

In this study, 10 provinces were selected as examples and the existence of the asbestos inventory report of the buildings to be demolished from a total of 175 district municipalities was investigated. Municipalities with full asbestos inspection are grouped as "low risk", municipalities with moderate inspection as "risky" and municipalities with weak asbestos inspection as "high risk". At the end of the research, 8 municipalities out of 175 district municipalities, 7 in Istanbul and 1 municipality in Mersin, carry out asbestos inspection. Again, 12 municipalities in Istanbul carry out moderate supervision. Unfortunately, asbestos inspection is not carried out in the remaining 155 district municipalities.

Since the asbestos control is weak in Esenyurt (957398 people) and Bağcılar (789633 people), the most populous districts of Istanbul, there is a risk of catching asbestos-related diseases in a total of 1747 031 people living in this district.

Air samples should be taken after work is complete to ensure the homeowner's safety. During the removal process; HEPA vacuum should use approved respirators and disposable clothing.

Many home repair or remodeling contractors do not hold this specific asbestos removal specialist certification. It is necessary to ensure that the selected person has completed an approved asbestos removal specialist course.

During demolition, dust suppression methods such as chemicals that adhere to asbestos and water must be used.

## RESPONSIBILITY OF LOCAL GOVERNMENTS FOR ASBESTOS CONTROL IN BUILDINGS TO BE DESTROYED

It is important for the health of the people living in the region that the "Asbestos Free" certificate for the buildings to be demolished without on-site inspections is not issued on paper and the situation is not turned into a source of commercial income. General and local governments need to increase their controls on this issue.

This study will form the basis for creating an asbestos risk map from district to neighborhood basis using geographical information system and remote sensing techniques by using spatial and attribute data.

### **Acknowledgment**

This work was supported by ASUD (Türkiye Asbestos Removal Specialists Association) and ISAF (Türkiye Federation of Occupational Health and Safety Associations).

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