# Asbestos

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## ASBESTOS TYPES AND GENERAL INFORMATION

There are two main categories of asbestos, namely **serpentines** and **amphiboles**. These classifications are based on the rock types which form the asbestos.

**SERPENTINE** – This family includes only chrysotile or "white" asbestos. Chrysotile is mined in North America and Canada produces about 20% of the world's output. This is a product that we will mainly be exposed to in Canada.

**AMPHIBOLE** – This family includes amosite and crocidolite.

**AMOSITE** is also called "brown" asbestos.

**CROCIDOLITE** is referred to as "blue" asbestos. Production and use of crocidolite has recently been banned in most countries as it is considered the most dangerous of the asbestos products.

Asbestos is found in veins in the host rock and is produced in a commercially useful form by successive stages of crushing and aspiration – similar to a vacuum cleaner lifting the fibers out of the rock. The longer fibers which are separated first can be worth more than $2,000.00 a ton. The shortest fibers which are separated last can be worth as little as $200.00 a ton.

Chrysotile amounts for about 90% of the world's consumption. To give an example of the size of one fibre of asbestos, the dimensions of a human hair is 75.0 micrometers in dimension, a glass fiber is 5.0 micrometers in dimension, and an asbestos fiber is 0.4 micrometers (invisible to the naked eye).

## TIME WEIGHTED AVERAGE OCCUPATIONAL EXPOSURE LIMIT

Reglations intended for asbestos exposure in fixed workplace where repetitive operations occur.

**TABLE 1**

| Jurisdiction | Published in or Administered By | Type of Asbestos | Time Weighted Average f/cc | Maximum Allowable Concentration f/cc |
|---|---|---|---|---|
| Canada | Health and Welfare | Crocidolite<br>Amosite<br>All Others | 0.2<br>0.5<br>2.0 | –<br>– |
| Newfoundland | Department of Labour Occupational Health & Safety | ACGIH Standard | (same as above) | |
| Nova Scotia | Occupational Health, Regulation under Occupational Health and Safety Act | ACGIH Standard | (same as above) | |
| New Brunswick | Occupational Health and Safety Commission | ACGIH Standard | (same as above) | |
| Prince Edward Island | Department of Labour | ACGIH Standard | (same as above) | |
| Manitoba | Workplace Safety and Health Act Manitoba Regulation 83/88 | ACGIH Standard | (same as above) | |
| British Columbia | Industrial Health and Safety Regulations, Section 35 | ACGIH Standard<br>All | (same as above)<br>0.2 (proposed) | Chrysotile 5.0<br>Amosite 5.0<br>1.0 (proposed) |
| Alberta | Regulations Respecting Asbestos under Occupational Health and Safety Act Regulation 570/82 | Crocidolite<br>Amosite/Tremolite<br>Chrysotile | 0.2<br>0.2<br>0.5 | 1.0<br>1.0<br>2.5 |
| Saskatchewan | Occupational Health and Safety Act – Section 13 | All | Minimum Possible Level (Effectively any lowest level selected) | |
| Ontario | Occupational Health and Safety Division, Ministry of Labour | Crocidolite<br>Amosite<br>All Others | 0.2<br>0.5<br>1.0 | 1.0<br>2.5<br>5.0 |
| Quebec | Commission du Sante et Securite au Travail Order–in–Council 55–90 | Crocidolite<br>Amosite<br>All Others | 0.2<br>0.2<br>1.0 | |

## ASBESTOS - WHAT IS IT?

Asbestos is the common name given to a group of naturally occurring mineral silicates (rock–type formations) which can be separated into flexible fibres. The name asbestos comes from the Greek word meaning unquenchable or indestructible.

Asbestos was dubbed the indestructible product. It has good insulation properties, will not rot, is acid resistant, fire resistant and flexible. It is also very effective as a reinforcing or binding agent when combined with plastic or cement.

The major use (approximately 70%) is in the construction industry. This is why it is important for full service restoration contractors to be knowledgeable about asbestos, especially when working on commercial buildings built prior to the mid nineteen seventies.

Two major classifications for asbestos products are **NON–FRIABLE** or **FRIABLE**. General product groupings of asbestos products used in construction, either currently or in the past, are:

<u>NON–FRIABLE</u>

1. Asbestos - cement building products (shingles, flat and corrugated

sheets, electrical panels).

2. Asbestos – cement pipes (supply, irrigation, drains).

3. Caulking, sealing and roofing compounds.

4. Floor tiles (asphalt, vinyl).

5. Papers (roofing, pipe protection or flooring – may be saturated with liquid).

6. Plastics (filled and reinforced).

7. Paints.

8. Stucco.

9. Gypsum joint cements.

FRIABLE

1. Sprayed or trowelled insulation (fire resistant coatings, thermal insulation, condensation control).

2. Sprayed or trowelled decorative or acoustic coats (texture materials).

3. Mechanical insulation (insulating block or insulating cement for pipes, tanks, vessels, boilers, etc.

4. Textiles (not saturated; for lagging, curtains or clothing).

# FRIABLE

## DEFINITION AND INFORMATION

FRIABLE

Friable material may be easily ground to dust between the fingers. The use of friable asbestos was banned in 1974 but it was used as late as 1977 or 1978 in construction projects.

One product which is usually friable and a major cause of concern in buildings is sprayed or acoustic or thermal insulation. The asbestos containing material was introduced into North America for acoustical and decorative purposes used largely in hotels and restaurants. Because of the fire resistant nature of the asbestos containing material it was soon found useful as a fire proofing coating. In 1950 Underwriter's Laboratory gave approval for the use of fibrous spray applied asbestos material as a fire proofing medium.

There was extensive use of this product for fire proofing of structural steel and other components of ships, schools, high rise office and public buildings. A combination of fire proofing and acoustical properties accounts for its large scale use in auditoriums, hallways, and classrooms of school buildings.

This product was applied by two different methods:

**DRY METHOD** (called fibrous) used a dry blend of asbestos fibres (usually from 30% – 90% of the total weight) in mineral or fiberglass, some Portland cement or gypsum, water soluble resins, starches and possibly other additives. The surface is often tamped subsequent to spraying, although even tamped materials tend to be softer and more friable than the wet applied products. The concentration of asbestos can vary greatly within one installation because of the method of application. **WET METHOD** (called cementitious materials) chrysotile asbestos (generally 5% – 30% by weight of the total formulation), mineral wool, and/or fiberglass were mixed with Portland cement or gypsum as cementitious binders in a slurry. This material tends to be more dense and therefore less susceptible to friability than dry applied materials. As a general rule these formulations usually contain chrysotile only. Most acoustic or textured sprays were applied by the wet method.

**Applications** the applications range from fully exposed in factories, partially

# NON-FRIABLE

## DEFINITION AND INFORMATION

NON-FRIABLE

The products with bound asbestos pose little danger of releasing airborne fiber unless cut, sawn, ground or sanded. A good measure of the potential hazard of a product is its friability. The friability of a material is a measure of the ease with which a material can be ground or pulverized. This will theoretically measure the ease with which fibers can be released to the air. Products and materials containing non-friable asbestos are still made and installed.

## CLASSIFICATION OF HAZARDOUS LEVEL OF ASBESTOS

Most provinces and states rule that 1% or more content of asbestos by **volume** is considered hazardous.

The Canadian Department of Environment's definition of when asbestos becomes hazardous is when it is more than 1% or more by **weight**.

These rules come into play when the friability of the product is looked at. Please note that a non-friable product can potentially be a friable product if it is damaged, cut, ground or sanded, or improperly handled.

**Health Concerns.** The biggest hazard from asbestos is from breathing it in.

A high exposure to friable asbestos during a one or two day exposure can take years to show up, and can potentially be fatal.

**Characteristics of Airborne Asbestos.** Asbestos fibers, unlike man made fibers such as glass, have the ability to be split into thinner and thinner fibers parallel to their length. At the finest size the fibers cannot be seen by the best optical microscope. Average fiber diameters of airborne asbestos fibers have been measured and range from 0.11 micrometers to 0.24 micrometers depending on the asbestos type. By comparison a human hair is

approximately 75 micrometers in diameter.

These fine fibers tend to settle very slowly in air. The aerodynamics of settling are determined by the mass, form and orientation of the fiber. The theoretical average time needed for a fiber to settle nine feet in completely still air is approximately four hours. If there are any air turbulents, the fiber could potentially never settle or could easily be re-entrained by air currents after it had settled.

**Biophysics of Asbestos.** The asbestos related diseases are generally linked by one factor, that is entry into the body via the respiratory tract. Once embedded in tissues some of the fibers remain within the body for extended periods. On inhalation the depth of penetration of asbestos fibers depend on their length, diameter and straightness.

In general, treatment of asbestos related diseases is insufficient. Cure is rarely possible; never in the case of mesotatlioma.

**Asbestosis.** One study of high exposure workers showed that 10% of asbestos insulation workers showed signs of disease within 10 years of starting in the trade, but within 20 years this had increased to 50% and after more than 20 years, 70% or more workers had evidence of the disease. More

than 70% of insulation workers have abnormal chest x–rays after 20 years of exposure. Smoking greatly increases the incident of asbestosis (10 times or more).

## ASSESSMENT OF ASBESTOS INSTALLATIONS

These are primarily for spray materials, not mechanical installation.

Factor One – Condition of Material

An assessment of the condition depends upon a combination of the quality of the installation, adhesion of the material to the underlying substrate, deterioration, vandalism and/or damage. These factors indicate the possibility of fibers being released in the air.

Factor Two – Water Damage

Water can dislodge, delaminate, and disturb friable asbestos materials that are otherwise in good condition. Water can carry fibers as a slurry to other areas where evaporation will leave a collection of fibers that can become re–entrained (re–suspended) in the air.

Factor Three – Exposed Surface Area

The exposed surface area of friable material has an effect on potential fiber fallout levels and the possibility of contact and damage. A useful criterion for determining the amount of exposed material is whether the friable material is

visible.

Asbestos material above a suspended ceiling is not considered exposed unless: (1) the ceiling panels are removed for regular maintenance; (2) the panels are damaged (i.e. due to vandalism, or maintenance, fire or water damage). Areas with louvers, grids, or other open ceiling systems should be considered exposed.

Factor Four – Accessibility

If the asbestos material can be reached, it is accessible and subject to accidental or intentional contact and damage.

Factor Five – Activity and Movement

These causes include air movement, building vibration from machinery or any other source, and activity levels of workers or occupants.

Factor Six – Air Plenum or Direct Air Stream

Friable asbestos–containing material within an air plenum or in an air stream if undisturbed, has a low potential of contaminating the building's

environment. However, it must be considered since contamination of large areas may result from contact or damage during maintenance, repairs, or renovations.

Factor Seven – Friability

The term friable is applied to material that can be crumbled, pulverized, or reduced to powder in the hand. In order to evaluate the material in question it must be touched. The asbestos–containing material can vary in degree of friability. The more friable the material, the greater the potential for asbestos fiber release and contamination. Sprayed asbestos material is generally more friable than most trowelled materials or mechanical insulation.

Factor Eight – Asbestos Content

The percentage for all types of asbestos present in a given sample should be added for the total asbestos content. While all asbestos materials present an exposure potential, those with a high percentage of asbestos can release more fibers.

In summary, the potential for exposure is highest for exposure due to

maintenance, renovation, alteration or demolition in an area.

It is rarely necessary to take corrective action in buildings containing asbestos insulation in order to protect the general occupants of these buildings. On the other hand, construction, demolition, renovation, maintenance, and custodial workers in asbestos–containing buildings may be exposed to significant asbestos fiber levels and may, during their work, cause elevated fiber levels for nearby occupants.

In the restoration business, it is important to be well rehearsed about the particulars of asbestos when discussing it with an insured and/or adjuster. Most of us in the insurance restoration business will not actually do the asbestos abatement work, but we should know the important identifying factors. Quite often we are the first contractor type of person on the job site. We must know when to call in, or recommend, a qualified testing and/or abatement firm.

If we, in our haste in emergency procedures, disturb asbestos it can cause enormous ramifications in both dollars and health safety of others. It is particularly important to be aware of causing a disturbance in an area where asbestos fibers can get into an air handling system.

Most of our major concerns will be in commercial structures built prior to the mid nineteen seventies. Each of our companies needs to furmulate a plan ahead of a claim coming in on how we will deal with a potential asbestos situation.

## CORRECTIVE MEASURES AND OPTIONS

If friable asbestos material is identified, some action to prevent exposure to asbestos is required. There are four basic approaches to controlling, managing or eliminating asbestos exposure.

1. Removal

   This Process is the most expensive control method in the short term and may require interruption of building activities. Removal is a necessary pre-requisite for any demolition of a building containing asbestos materials.

   Fireproofing material which has been removed (other than pre-demolition) should be replaced to maintain compliance with fire and building codes.

2. Encapsulation

   For encapsulation, the asbestos material is coated with a bonding agent called a sealant. Sealants penetrate and harden the asbestos material or cover the surface of the material with a protective coating. Sealants are applied over the surface of the material using airless spray equipment

at a low pressure setting.

Encapsulation should be limited to areas where asbestos-containing material will not be subject to further damage or contact. Encapsulation should also be limited to asbestos material which is capable of supporting the additional weight of the sealant. Encapsulated materials should be routinely inspected for deterioration or damage. Although the method may be less costly than removal in the short term, the long term cost will be greater because ultimately removal will be necessary. For all these reasons encapsulation is rarely chosen as a control measure. The same set up and precautions are required to do encapsulation as for a full removal.

3. Enclosure

For enclosure, a barrier such as a suspended ceiling is constructed between the asbestos material and the building environment. A canvas, metal, or plastic jacket on pipe insulation is considered an enclosure. Although the method may be less costly than removal in the short term, the long term cost will be greater because ultimately removal will be

necessary.

4. Surveillance with a Management Programme

In the event that action is deferred, a continuing inspection programme should be implemented. The asbestos material should be routinely checked for deterioration or damage. The maintenance staff and/or subcontractors working in areas with asbestos must also be aware of the correct procedures to be used to reduce any potential hazard.

The cost of establishing a management programme is not great. The major cost of deferring removal is the increased cost of maintenance or minor renovation. Material will have to be removed if deterioration, building renovation or demolition will release airborne asbestos to building environment.

Pages 21, 22 and 23 which follow give the advantages and disadvantages of the four asbestos control options.

## REMOVAL

| Advantages of Method | Disadvantages of Method | Comments |
|---|---|---|
| Eliminates asbestos source | Usually most costly and complicated method | Mandatory prior to demolition or major renovation |
| Ends need for surveillance programme | Usually most time consuming method | Significantly cheaper if combined with renovation or demolition |
| | Replacement with substitute material may be necessary | |
| | Highest potential for worker exposure during removal | |

## ENCAPSULATION

| Advantages of Method | Disadvantages of Method | Comments |
|---|---|---|
| Usually more rapid and economical method | Asbestos source remains | Temporary measure only, will eventually require removal |
| Reduces potential for fibre release | If material is damaged or deteriorating, additional weight of the sealant may cause delamination | Type 3 (High Risk) work under all provincial standards |
| | Management system required. Precautions necessary to prevent damage during maintenance or removal | Difficult to perform in many areas of difficult access |
| | Continuing inspection required to check for damage to encapsulated surface | |

## ENCLOSURE

| Advantages of Method | Disadvantages of Method | Comments |
|---|---|---|
| Controls exposure | Asbestos source remains | Very cost effective to repair damage to mechanical systems |
| May be rapid, economical, uncomplicated method | Deterioration may continue behind enclosure | Temporary measure only, will eventually require removal |
| | May be costly if enclosure disturbs functions of other systems (e.g. enclosure may require lighting changes) | |
| | Management system required. Precautions necessary for entry into enclosure for maintenance or renovation | |
| | Continuing inspection required to check for damage to enclosure system | |

## SURVEILLANCE WITH A MANAGEMENT PROGRAMME

| Advantages | Disadvantages | Comments |
|---|---|---|
| Initial cost lowest | Potential for exposure may increase | May be very difficult and costly to implement and enforce. |
| Minimum disruption to building operation | Management system required. Precautions necessary to prevent damage during maintenance or renovation | |
| | Continuing inspection and re-evaluation necessary. | |

## RESTORATION CONTRACTORS OVERVIEW

It is generally accepted that most construction methods prior to 1974 in commercial or institutional buildings frequently included the use of asbestos in one form or another. A contractor is regulated by Federal and/or Provincial legislation to ensure that their workers and/or building occupants are not exposed to airborne asbestos fibers during repair, construction, demolition, etc. Wherever there is any question or concern about asbestos being present a sampling should be done from various areas and sent to be analyzed by a qualified lab before work begins.

If asbestos is found then all parties involved can discuss and decide on the appropriate measures that will be included in the project, ie. removal, encapsulation, enclosure, or management programme. Then a qualified certified professional company should proceed with whatever level of work is required.

Asbestos is a product that is very dangerous and is potentially lethal to people who are exposed to it. In the past, and probably at the present time, some contractors have taken short cuts and removed asbestos product without any safety precautions in place. This may save some money initially on a

project, but what price can you put on the lives of your workers or building occupants. Asbestos can be handled safely without exposing people to the health risks.

Eventually all buildings will have to remove asbestos–containing materials. There is not a timeframe on this yet, but it is a given that this will be legislated in the foreseeable future. In the meantime, as long as proper testing and procedures are used in working with or around asbestos, we can all work with it safely. A large concern a contractor should have in removing asbestos is that if they try to take short cuts and do it improperly they can contaminate a much larger area if airborne asbestos gets into the ventilation system and the so–called cost savings can result in very large litigation cost and/or corrective action.

Every province and state has its own regulations on asbestos. The Federal Government in Canada, to date, has basically been going along with the current rules and regulations in place provincially. Public Works and the Department of National Defence (DND) have their own specifications which must be followed.

Asbestos should not be taken lightly and should not be viewed as a way

to increase a job cost. Basically, commercial and institutional buildings should be treated with extra care and precautions even during the estimating stage to ensure your health and that of co-workers is not endangered. Certified professional contractors only should be used in dealing with these type of buildings.

## HEALTH DEFECTS FROM NON-OCCUPATIONAL EXPOSURE

Of great importance to persons involved in asbestos control in buildings is the likelihood of asbestos related disease occurring as a result of non-occupational exposure to asbestos. This will determine the extent to which control or removal programmes are required. Quoting from the overview of the Canadian Royal Commission on Asbestos: "Asbestosis is a disease which is attributable solely to occupational exposure to asbestos. There is substantial evidence that at a very low level of occupational exposure to asbestos, the fibrotic process in the lungs, if indeed it can even be initiated, will not develop to the point of producing asbestosis at the level of clinical diagnosis or of producing any manifestations that would cause even the mildest discomfort to an individual."

And: "The individuals who have been afflicted with asbestos specific diseases have almost invariably been occupationally exposed to asbestos. However, there is incontrovertible evidence that mesothelioma has afflicted individuals who shared the domicile of an asbestos worker at the time this worker was exposed. There is weak evidence that individuals may have contracted disease from exposure to asbestos in the neighbourhood of asbestos

plants. We have found no evidence that disease afflicts individuals who breathe asbestos in the outdoor air or inhale it as occupants of asbestos containing buildings." It should be noted that occupational exposure to asbestos is not solely in asbestos miners or insulators. Workers who cut asbestos–cement sheets in construction, workers who repair asbestos insulated boilers or piping, sheet metal workers or electricians who must work in ceiling plenums sprayed with asbestos must all be considered to be occupationally exposed to asbestos. Also, cleaners and/or restoration technicians who have to work in or clean the above areas due to restoration work are also somewhat at risk.

## BUILDING INSPECTION AND SAMPLING

An asbestos control programme or an abatement project begins with locating all friable materials in the building, sampling these materials and determine whether those materials contain asbestos. (Regulations require lab analysis – visual analysis is not accepted.) Most provincial and state regulations require an inspection if any friable material is deteriorating and before any construction or demolition operation. It is important to note that all friable materials do not contain asbestos, but if installed during the years when asbestos was in use, all friable materials should be sampled.

To conduct an inspection, it is important that all friable material be located. This includes exposed fire proofing on beams, decks, columns, all material hidden by suspended ceilings, pipe and boiler insulation and all acoustical friable materials. The methods of testing along with each of their advantages and disadvantages, are as follows:

# ASBESTOS TESTING METHODS

| METHOD | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Optical (PCM) – Polarized Light Microscopy | Rapid analysis<br>On site 3–4 hrs<br>In lab approx. 24 hrs. | Fibers less than 0.3 micrometers in diameter are invisible. |
| | Regulated Method | No identification of fiber as asbestos. |
| | Inexpensive ($40–$80 per sample). | Requires trained and experienced analyst. |
| | Easy Sampling | |
| Optical (FAM) – Fibrous Aerosol Monitors | Immediate results | Not useful for personal samples (where workers are working). |
| | Impressive equipment | Easily mis–read (accidentally or intentionally). |
| | Good at low calibrated concentrations. | Unit must be frequently checked and calibrated. |
| Canada Post insists this method be used. | | Expensive equipment and calibration. |
| | | Same limitations as PCM method. |
| Transmission Electron Microscopy (TEM) | Detects all fibers | Slow |
| | Identifies all fibers | Expensive ($400–$600 per sample). |
| | Comparison with back–ground | Lengthy sample collection. |
| | Used for litigation and tenant concerns. | Limited historical data or regulatory requirement. |

## ASBESTOS - INSULATION ON MECHANICAL SYSTEMS

Asbestos reinforced in organic boards or cements used for mechanical insulation are quite friable if not jacketed or covered. In most instances the friable product was covered with painted cotton wrapping or mesh reinforced cement. Pipe insulation can be cut so as to expose friable asbestos products. Preformed materials may exist as uniform block material or formed paper like products. These products can be classified as potentially harmful by being disturbed by renovation or maintenance or by deteriorating through use.

Asbestos products, cement or insulating compounds were frequently used in mechanical systems and quite often combined with fiberglass pipe insulation. The incredibly wide range of asbestos containing products used for sprayed and piped applications and their variety of appearances means that it is impossible to determine by eye or from building plans if a product contains asbestos.

From 1890 to approximately 1930 it was common practice to mix asbestos with cement and trowel on pipes. Around 1925 – 30 preformed insulation started being manufactured and this product also was usually heavy in asbestos.

## REGULATIONS

The industrial regulations concerning asbestos in Canada are largely intended towards asbestos mines or industries using asbestos in manufacturing processes. Most of the regulations are administered under occupational health legislation and generally are concerned with airborne fiber levels in occupational exposures. The regulations are rapidly changing.

The time weighted average (TWA) (Permissible Exposure Limit [PEL] or occupational exposure limit [OEL]) is the legislated concentration for exposure averaged over an eight hour day or 40 hour workweek. The maximum allowable concentration (MAC) (or short–term exposure limit [STEL]) is the maximum concentration of airborne fibers in the workplace air to which a worker may be exposed.

The regulations are intended for asbestos exposure in fixed workplaces where repetitive operations occur.

## CANADIAN LABOUR STANDARDS

## IN BUILDING AND CONSTRUCTION

The Royal Commission on Matters of Health and Safety arising from the use of Asbestos, in Ontario, investigated the exposure of construction and demolition workers to asbestos in the early 1980's. They concluded (Page 14, Final Report) that:

> "Such workers (engaged in demolition, asbestos removal or building maintenance) may become exposed to asbestos levels that greatly exceed the control limits which apply in fixed place industry. the exposure involved is to amosite as well as chrysotile asbestos. This exposure, in turn, may come in short, intense bursts than can overcome the normal defence mechanisms of the human lung. Where demolition, removal, and certain repair activities are involved, the workplace is not fixed but instead resembles that of the typical construction project. It follows that worker protection can better be enforced by specifying work procedures than by using air monitoring to enforce control limits, and we prescribe elaborately in this regard. The magnitude of the potential risk from exposure in building demolition is such that we

specifically prescribe that all friable asbestos should be removed from buildings prior to demolition."

The Royal Commission concluded that to protect construction and maintenance workers a regulation by procedure was most appropriate. This divided building maintenance, construction and demolition work into three categories as follows.

| Category | |
|---|---|
| Type 1 or 'Low Risk' | Low potential for exposure to airborne asbestos (non-friable) with almost no health risk. |
| Type 2 or 'Moderate Risk' | Significant potential for exposure to airborne with some health risk (friable). |
| Type 3 or 'High Risk' | Potential for high exposure to airborne asbestos with high health risk (friable). |

The Canadian Federal Government has no published standard for asbestos in construction or buildings and generally complies with provincial standards.

The "Regulation Respecting Asbestos on Construction Projects and in

Buildings and Repair Operation" is the regulation of concern of most persons involved in asbestos control.

The application of the regulation applies to:

- Every project, owner of project, constructor, employer and workers on project.
- Repair, alteration or maintenance of a building and all persons involved.
- Every building with friable material which may contain asbestos.
- All demolition (removal mandatory).
- Machinery, equipment and vehicles.

Each province has its own rules and regulations which can change periodically and you should keep in contact with the proper regulatory board, in the province where you work, to keep updated.

Also, transportation of asbestos and disposal standards have to be complied as it is considered hazardous waste.

## OPERATIONS AND MANAGEMENT - MINOR WORK (TYPE 1)

There are prescribed rules and regulations for every type of project, repair, maintenance and construction work when you are working with materials containing asbestos.

There is a check list format with the elements of an asbestos control programme that will allow you to determine when you can use Type 1 procedures.

The precautions to be taken in Type 1 tasks can be summarized as follows:

1. Before beginning work, during work, and at the end of the work, clean up visible dust by wet cleaning or with a High Efficiency Particulate Air (HEPA) filtered vacuum.
2. Use drop sheets to control the spread of dust. Wet clean or HEPA vacuum these or discard at completion of work as asbestos waste.
3. Always dispose of asbestos-containing material in sealed and labelled containers, as it is to be treated as Hazardous Waste.
4. When possible, wet the material which will be disturbed.
5. Do not use compressed air in any cleaning operation.

6. Workers must not eat, drink, or smoke in the area and must wash hands and face at the completion of the work.

7. Respirators are not required for Type 1 work. However, if a worker requests a respirator, the employer must provide a respirator suitable for asbestos.

## OPERATIONS AND MANAGEMENT - MODERATE RISK WORK

## (TYPE 2)

This is the stage where you would have to get an asbestos abatement contractor involved, or be properly certified and licensed yourself before doing this level of work.

The following activities where asbestos material is present will result in Type 2 procedures to be followed.

Any activity which disturbs the suspended ceiling with fallen asbestos on the tiles or directly contacts friable material may result in high and potentially dangerous airborne levels. i.e. (Fixing hangers on beams; wiring or installing ceiling grids; boiler and pipe maintenance or repair.)

Type 2 operations are the most commonly encountered asbestos operations in a building with sprayed asbestos or asbestos on mechanical systems.

The precautions to be taken in Type 2 tasks can be summarized as follows:

1. The work area is to be identified by asbestos warning signs.
2. The spread of dust must be controlled by drop sheets. If the worker is

indoors, an enclosure must be erected for most work if the area is not enclosed by walls. Repair of pipe or mechanical insulation requires only a drop sheet, not an enclosure. The ventilation system must be disabled and all openings sealed.

3. A HEPA vacuum or wet cleaning is used to clean up friable material which may be disturbed by the operation. No compressed air to be used in cleaning.

4. Any friable material which will be disturbed is thoroughly wetted by water wherever practical and safe. A wetting agent is added to the water to increase the penetration into the friable material.

5. All waste must be disposed of in labelled, sealed containers.

6. Workers in area wear full body coveralls with hoods which can be readily cleaned or discarded.

7. Workers wear non–powered air purifying dust respirators.

8. During and at the end of the work, the area must be carefully wet cleaned or HEPA vacuumed. Drop sheets and the enclosure walls can be cleaned for reuse or are discarded as asbestos waste.

9. At the completion of work, the workers wash their hands and face.

10. The employer must annually submit an asbestos work report to the Ministry of Labour, for every worker who performs Type 2 or 3 work.

## TYPE 3 WORK – FROM BIDDING TO CONTAMINATED WORK

It is very important for an asbestos abatement contractor or a general contractor who suspects asbestos to view the site and have testing done to determine whether asbestos is present. Some of the important items an abatement contractor will need to look for are outlined as follows:

Check Analytical Results of Bulk Samples

A contractor should determine what type of asbestos is present on the project. Information contained in the analytical reports is important because different types of asbestos will require various handling techniques.

Inspect the Nature of the Asbestos Containing Material

The contractor should determine the hardness and texture of the asbestos–containing material to be removed (must touch it and/or use depth gauge). Also note whether the asbestos material has been painted over. Is the asbestos applied on lath, brown coat, cement, smooth or rusted steel, or is there an adhesive coat such as asphalt?

Check Accessibility of Material

The accessibility of the materials for removal is important in the labour that will be required and if special scaffolds, platforms, ladders, etc. are required. Several factors that may enter into cost factor are ceiling height, false ceilings,

pipes, sprinklers, ducts, sloping floors, fixed barriers, etc. Frequently the cost of scaffolding and platforms is a large percentage of the contract value.

Check for Difficulty of Isolating the Work Area

The area will have to be isolated and how difficult will this be?

Determine if Area Adjacent to Abatement Activity will be Occupied

If areas adjacent to the abatement activity will remain occupied, several important practices should be observed. Most importantly, the HVAC system will need to be altered, or the openings of the ducts into the work areas should be completely sealed off. This sealing of the HVAC helps ensure the airborne fibers will not be drawn into the air return system and dispersed throughout adjacent areas, or the supply system will not place the work area under positive pressure and cause airborne fibers to escape. In some instances the seams in the HVAC systems will have to be caulked or sealed.

Determine Room Volume and Required Air Changes

An estimate of the air volume in the work area is necessary for determining the number of units needed to achieve the desired number of air changes per hour. The area will have to be brought to and remain under negative air pressure. The cost of removing and later replacing windows if necessary to vent the units is a consideration. Additional ducting may be necessary to vent

the units.

Check Items Requiring Special Protection

These items might include walnut panelling, cabinets, glass piping, carpets, lab equipment, dangerous chemicals, computers and elevators. Determine if Existing Carpet is to be Removed

If the carpet is to remain, special precautions must be used to protect it. Normally it is more cost effective to remove and/or replace the carpet before abatement work begins.

Elevators or Shafts

Duct or pipe chases or shafts will allow a natural movement of air and may cause difficulties of sealing areas. These areas can become contaminated with asbestos or their movement can cause air displacement in contaminated areas. Special precautions to properly seal off these areas will need to be taken.

Extent of Removal

The exact extent of work must be understood by all parties involved.

Temperature of Work Area

Because the HVAC system is sealed off and the area is under negative air pressure this is an item to be aware of.

Power in Work Area

Additional safety hazards that need to be considered include all electrical circuits and/or receptacles, equipment, etc. Since the work area in an asbestos abatement job will commonly contain large amounts of water, potential for electrical hazards will be greatly increased. Contractors should use their own ground fault panel to supply electricity to the work area.

Site Facilities

The type of facilities will have to be assessed, where equipment can be set up, stored, etc. If there is not adequate space available on the job site the area will have to be built or set up. A decontamination chamber is an absolute must and there must be room for this, as well as shower facilities and hot and cold water. If air supplied respirators need to be used the contractor must determine how the hoses will reach the area from the air generating source.

Schedule

Will the job need to be done when other people are present, will a day or evening or backshift or weekend be the best time to do the job? Where can the waste removed and temporarily stored? All of these items have to be assessed.

## PIPE INSULATION REMOVAL USING GLOVE BAGS

The removal of minor amounts of pipe insulation can be done using the techniques of full enclosure by using a special glove bag system. Major amounts of pipe insulation removal will require Type 3 precautions.

A glove bag is specially designed to wrap around a pipe and have sealed armholes and a pouch for tools inside the bags which allows removal of the insulation inside the bag. Once the insulation is removed from the pipe and placed in the bottom of the bag a small port is used to wet the inside of the bag and wash down the pipe. These bags are costly, from $75 and up, but can prevent a much costlier set up to ensure asbestos material is not caused to contaminate the air. Each province has regulations on the amount of lineal feet of pipe that can be stripped using this method. Usually it is in the 10–20 foot range.

## A DECONTAMINATION UNIT

It is a regulation that a decontamination area has to be set and this would include the following areas.

Clean Change Room

Workers use this area to suit up, store street clothes, and don respiratory protection on their way to the work area, and to dress in clean clothes after showering.

Shower Room

Workers pass through the shower room on their way to the removal area, and use the showers on their way out after leaving contaminated clothing in the equipment room. An area on the clean side of the shower should be provided for cleaning of respirators and charging of PAPR batteries.

Equipment and Dirty Change Room

This is a contaminated area where equipment, boots and showers, hardhats, goggles and any additional contaminated work clothes are stored. Respirators are worn until workers enter the shower and wash in the shower stream.

In addition to the workers decontamination unit, a separate unit is normally constructed for waste handling. It consists of:

Staging Area

This area is in the work area for gross removal of dust and debris from waste containers and equipment, labelling and sealing of waste containers, and temporary storage pending removal of container cleaning room.

Container Cleaning Room (sometimes called wash room)

Between staging area and holding room with two doorways, one to the staging area and one to the holding room.

Holding Room

Between container room and uncontaminated area, with two curtain doorways, one to the washroom and one to the uncontaminated area.

## NEGATIVE PRESSURE SYSTEM

The strategy for the use of negative air systems in abatement work includes two main goals.

- Changing air within the containment area approximately every 15–20 minutes.
- Establishing conditions in which air from all portions of the sealed zone is being pulled toward negative air filters.

Negative air systems can be used on an abatement project to accomplish several positive effects.

- Containment of airborne fibers even if the barrier is ripped or punctured.
- Lower concentration of airborne fibers in the work area.
- Worker comfort and increase productivity.
- Improved efficiency in final clean–up.

**A negative pressure system is one in which the static pressure in an enclosed work area is lower than that of an environment outside the containment barriers.**

Air moves into the work area through designated access spaces, the

decontamination chambers and the holes which are bound to be present even in the best sealed work site. Exhaust air is filtered by a high-efficiency particulate air (HEPA) filter to remove asbestos fibers.

## TYPE 3 WORK – WORKER PROTECTION

## (INCLUDES RESPIRATORY REQUIREMENTS FOR TYPE 2 WORK)

The use of personal protective equipment is required for persons who are working in contact with asbestos where the airborne levels cannot be guaranteed to remain below the legislated occupational levels. Respirators will be required for all construction work and most maintenance work around friable asbestos since fiber levels cannot be controlled. This will apply to all Type 2 and Type 3 work which includes maintenance on or near friable asbestos as well as asbestos removal, enclosure or encapsulation projects. The most important type of protection is, of course, the respirator. Protective clothing is usually provided to prevent asbestos fibers from being carried around on the clothing.

### RESPIRATORY PROTECTION

The function of a respirator is to provide clean air to its user and to prevent the contaminated air from entering the face–piece. All masks selected for use in asbestos abatement must have a Testing and Certification (TC) approval issued jointly by the National Institute for Occupational Safety and Health (NIOSH) or the Mine Safety and Health Administration (MSHA).

There are two main types of respirators – air purifying respirators and supplied air respirators. Air purifying respirators rely on drying air through a filter prior to supplying air to the face–piece. Supplied air respirators provided the wearer with air from either a compressed air bottle or tank carried by the workman or more commonly from an air line supplying air from a compressor or tanks outside the work area.

The higher the Protection Factor (PF) the greater the protection required. There are mathematical calculations to determine the PF factor and the proper respirator type can be selected from this calculation.

## SUMMARY

Part of being an "expert" in our restoration field is to be well versed in areas of potential concern in our restoration procedures. Even though most restoration contractors will not be involved in the actual asbestos abatement procedures, it is important that we be familiar with what to look for and be able to talk about the options in a professional manner.

Most restoration contractors, especially in the United States, will want to stay out of the "loop" altogether and will not want to be involved in even sub–contracting the testing as today we have to be very concerned about any possible litigation.

Our suggestion is that each restoration contractor set up a procedure they will use if they even suspect a problem. It is best to make these procedures and obtain knowledge under normal conditions than on the spot under pressure at the site of a large loss. The professional way in which you handle this can go a long way in building confidence with your insured and adjuster, who usually are relying on your knowledge and expertise on the proper procedures to handle a claim.