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**EVERYONE'S
RESPONSIBILITY**



Guideline for Working with Asbestos

March 2008

Manitoba 

Guidelines For Working With Asbestos

**Workplace Safety & Health Division
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March 2008



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INTRODUCTION

Introduction

This guideline provides general information and minimum requirements for employers, workers, consultants, abatement contractors and others concerned with the use, storage, handling, removal and disposal of asbestos at a workplace.

Workplace Safety and Health Regulation Requirements

The Workplace Safety and Health Act (W210), and Parts 36 & 37 of the Workplace Safety and Health Regulation (M.R. 217/2006) require employers and workplace parties to take specific actions when a potential health risk is present in the workplace.

This guideline explains the duties of workplace parties when asbestos is present, including:

- monitoring exposure limits
- labelling
- training
- personal protection
- waste disposal
- removal procedures
- handling products containing asbestos
- medical surveillance

OBJECTIVES, APPLICATION AND DEFINITIONS

Objectives

The objective of this guideline is to provide information to:

- a) prevent exposure to airborne asbestos fibres at work
- b) prevent harmful health effects to employees exposed to airborne asbestos fibres
- c) provide practical control procedures and practices to minimize exposure to asbestos
- d) provide specific procedures for asbestos removal

Application

This guideline applies to all workplaces where asbestos or asbestos-containing materials are used, stored, handled or demolished. It also applies to workplaces where concentrations of airborne asbestos fibres are produced, or where asbestos waste is produced, stored or disposed of, and may include:

- a) manufacture of materials or products containing asbestos
- b) use or application of asbestos-containing material
- c) stripping, repair or maintenance of asbestos-containing material
- d) demolition of a plant or structure with asbestos-containing material
- e) transportation, storage and handling of asbestos or asbestos-containing material
- f) custodial and service activities in buildings containing asbestos
- g) maintenance and renovation to ductwork/HVAC systems in buildings containing friable sprayed asbestos material

Definitions

- Amended water – water with the addition of either 50 per cent polyethylene ester and 50 per cent polyethylene ether, or other non-sudsing type soap, at a concentration of approximately 50 ml/litre of water
- Asbestos – the fibrous form of crocidolite, amosite, chrysotile, anthophyllite, actinolite, tremolite or a mixture containing any of those minerals
- Asbestos-containing material –
 - a) a friable material containing 0.1 per cent or greater asbestos
 - b) a non-friable material containing 1.0 per cent or greater asbestos
- Asbestos dust – particles of asbestos or settled particles of asbestos which may become airborne in the workplace

- Asbestos fibre – a particle form of asbestos greater than five micrometres in length, with a minimum length to diameter ratio of three to one
- Double-bagged in 6-mil polyethylene bags – the material intended to be disposed of is placed into two polyethylene bags each of which is a minimum of six millimetres thick
- Decontamination unit – a series of interconnected airlocks used for employee or waste decontamination
- Designated material – a chemical or biological substance that meets criteria as a carcinogen, mutagen, respiratory sensitizer, reproductive toxin, fetotoxin or teratogen under controlled products regulations
- Friable material – a material that when dry can be crumbled, crushed or powdered by hand pressure
- HEPA filter – a high efficiency particulate air filter capable of removing 99.97 per cent of a 0.3 micrometre aerosol
- Negative pressure enclosure – a restricted enclosed area within a workplace where reduced pressure is created by removing air from the enclosure and passing it through a HEPA filter, to the outside of the building
- Non-friable material – a material that when dry cannot be crumbled, crushed or powdered (i.e. vinyl asbestos floor tiles or sheets, ceiling tiles, and gaskets).
- Technically qualified person – a person who, through education, training and experience, understands the nature, monitoring and control of health hazards associated with exposure to asbestos. Registered occupational hygienists (as registered by the Canadian Registration Board of Occupational Hygiene) and certified industrial hygienists (as certified by the American Board of Industrial Hygiene) are deemed to be technically qualified people.

GENERAL DUTIES

General duties of employers

All employers have legal responsibilities under *The Workplace Safety and Health Act* and *Workplace Safety and Health Regulation*.

Employers must inform prime contractors and subcontractors of safety and health hazards at the workplace and ensure, as much as is practical, that workers at the workplace, who are not under the employers direct control, perform their work according to requirements of the Act and regulation.

General duties of workers

All employees have legal responsibilities under the *Workplace Safety and Health Act* and regulation.

When working with asbestos, employees should inform management of any changes in work processes that may result in exposure to asbestos dust.

EXPOSURE LIMITS

Occupational Exposure Limit

Asbestos is identified as a designated material under Part 36, section 36.5(1) (b) of the *Workplace Safety and Health Regulation* 217/2006.

The occupational exposure limit of a designated material must be as close to zero as is reasonably practicable but shall not exceed the Threshold Limit Value (TLV[®]) established by the American Conference of Governmental Industrial Hygienists (ACGIH).

The Workplace Safety and Health Division recognizes the level as close to zero as is reasonably practicable for all forms of asbestos as 0.1 fibres per cubic centimetre of air.

Post abatement exposure limit

Airborne asbestos fibre concentrations must be reduced to a maximum concentration of 0.01 fibres per cubic centimetre of air for all forms of asbestos before the negative pressure enclosure is removed and workers and others are allowed to reoccupy an area where asbestos has been removed.

MONITORING THE WORKPLACE

General

The concentration of airborne asbestos fibres must be measured in areas where a risk of exposure might occur. Requirements for monitoring are listed under Part 36 of the Workplace Safety and Health Regulation, section 36.6 (1) to (5).

Area and personal monitoring must be carried out to determine the extent of exposure to airborne asbestos fibres when asbestos-containing material is used in a manner that may emit airborne dust.

Bulk analysis of materials should be performed if composition data are not available. Part 37 of the Workplace Safety and Health Regulation, section 37.1 (2), states that any material suspected of containing asbestos is considered to contain asbestos until it is proven to be asbestos-free.

Manufacturers of materials containing asbestos should make available any monitoring results that they have that could result from the foreseeable use and misuse of their product.

The employer may use the manufacturer's data from monitoring representative exposures when assessing worker exposure.

Monitoring plan

Employers should develop and implement a plan to keep worker exposure to airborne asbestos fibres under control.

Personal and area monitoring should be performed to measure exposure.

Objectives of the monitoring program are to:

- a) ensure that the health of the workers is protected
- b) ensure that the current preventive actions are still effective
- c) ensure that the concentration of airborne asbestos fibres, previously measured, has dropped or remains unchanged
- d) ensure that any changes made in manufacturing processes or work practices do not lead to overexposure to airborne asbestos fibres
- e) promote use of more effective preventive measures

An initial survey should be taken to:

- a) determine sources of exposure to airborne asbestos fibres
- b) decide whether a major survey or an ongoing monitoring program is needed
- c) establish the place and time for samples to be taken

Part 36 of the Workplace Safety and Health Regulation, section 36.2 (2), requires any changes in equipment, materials or work practices that may cause a change

in levels of exposure to airborne asbestos fibres, be considered when re-assessing potential health risks from exposure.

Area Monitoring

Area monitoring should be done to determine the distribution of asbestos dust:

- a) close to the source of emission, to evaluate dust concentrations or the effectiveness of engineering controls
- b) at the perimeter of each work area, to ensure containment of airborne fibres
- c) at various places in the working area, to identify locations of potential asbestos contamination
- d) in various working areas that represent typical exposures

Personal monitoring

Personal monitoring should be performed in the worker's breathing zone to evaluate the risk to the individual worker.

Personal monitoring must be carried out while the worker is working.

Personal monitoring must be done in a way that the average and, in any case, the maximum level of exposure of each worker can be determined when the concentration of airborne asbestos fibres may vary from one work operation or phase to another.

Personal monitoring should be done at various times throughout the work shift and, where appropriate, should include short-term sampling during periods of peak emission.

Exposure profiles of particular jobs or occupational categories should be constructed from the monitoring data of different operations and from the workers' exposure times in these jobs.

Measurement method

The concentration of asbestos must be measured in accordance with *NIOSH Manual of Analytical Methods*, 3rd Edition, U.S. Department of Health and Human Services, Public Health Service, Centres for Disease Control, National Institute for Occupational Safety and Health, Division of Physical Sciences and Engineering using:

- a) method 7400 or 7402 for airborne asbestos exposure analysis
- b) method 9000 or 9002 for bulk asbestos analysis
- c) an alternate method established by a recognized occupational hygiene practice

Direct reading instruments, such as particle counters and dust photometers, should be used only for area monitoring and engineering applications.

Direct reading instruments must be calibrated according to the manufacturer's recommendations.

Monitoring results from direct reading instruments should be compared regularly to the NIOSH methods referenced above.

Record keeping

The employer must keep records on all parts of asbestos exposure monitoring.

Records must be clearly marked to include date, work area and location.

All relevant data measuring airborne asbestos fibres in the working environment should be systematically recorded.

Any worker, member of the workplace safety and health committee or worker safety and health representative must have access to these records.

Besides the numerical results of measurements, the monitoring data should include:

- a) composition and trade names of materials containing asbestos
- b) location, nature, dimensions and other particular features of the workplace where area measurements were made
- c) exact location of personal monitoring measurements and the names and job titles of the workers involved
- d) sources of airborne asbestos fibres, their location and the type of work being performed during sampling
- e) relevant information on the functioning of the process, engineering controls, ventilation and weather conditions with respect to emission of airborne asbestos fibres
- f) date, exact time of sampling and duration of each sampling period
- g) duration of the worker's exposure
- h) use or non-use of respiratory protection
- i) name of the person responsible for the sampling and analytical analysis

Individual results of airborne asbestos concentration measurements and time-weighted averages must be calculated and recorded.

All monitoring records must be stored and preserved by the employer for 30 years.

Application of monitoring data

Corrective action must be taken immediately if the occupational exposure limit is exceeded.

Monitoring must be continued until it can be determined with reasonable accuracy that no worker is likely to be exposed in excess of the occupational exposure limit.

Where the monitoring results show that workers are exposed to a concentration of asbestos in excess of the occupational exposure limit, the employer must inform the workers and the workplace safety and health committee or the worker safety and health representative of the action(s) to be taken.

Warning signs and instructions for appropriate protection must be provided at each location where the concentration of airborne asbestos fibres exceeds the occupational exposure limit.

PREVENTATIVE METHODS

Alternative material

Whenever possible, asbestos should be replaced by harmless or less harmful substances that offer the same technical advantages.

When an alternative material is considered, all health hazards associated with the manufacture, handling, use, transportation, storage and disposal of the alternative material should be reviewed.

Methods of control

Appropriate measures of engineering, work practice and administrative control must be taken to eliminate or reduce worker exposure to airborne asbestos to the lowest practical level.

Engineering controls should include mechanical handling, ventilation and redesign of a process to eliminate, contain or collect asbestos dust by:

- a) process separation, automation or enclosure
- b) bonding asbestos fibres with other materials to prevent dust generation
- c) general ventilation of the working area with clean air
- d) local ventilation of processes, operations, equipment and tools to prevent dust generation
- e) treating contaminated air before releasing it to the environment
- f) use of wet methods where appropriate
- g) separating workplaces for particular processes

Appropriate safe work procedures must be followed where materials or processes may produce airborne asbestos fibres.

These work procedures include:

- a) using and maintaining process machinery, installations, equipment, tools, local exhausts and ventilation according to instructions
- b) wetting asbestos products and materials at the workplace before processing, handling, using, machining, cleaning, stripping or removing
- c) cleaning machinery and work areas appropriately
- d) using personal protective equipment appropriately

Asbestos control program

Employers must develop and implement an asbestos control plan to reduce worker exposure to airborne asbestos fibres (according to Part 37 of the Workplace Safety and Health Regulation).

The written asbestos control plan must include:

- a) a description of each operation where airborne asbestos fibres are

released, including the processes and machinery used, the materials handled, the control devices, the number of exposed workers, the job responsibilities of each worker, the operating procedures and the maintenance practices

- b) a specific description of the means for controlling exposure to airborne asbestos fibres, including a description of the work practices or administrative controls
- c) engineering plans, material safety data sheets, study reports or other relevant technical information
- d) air monitoring data on the efficiency of control measures
- e) a detailed implementation schedule

The control plan must be updated regularly to reflect the current status of technical and other developments.

Where appropriate in large enterprises, specified departments, branches or people should have specific control program responsibilities, particularly involving:

- a) design of new buildings, equipment, processes and materials
- b) purchase of materials, products, machinery or equipment
- c) contracting for the supply and maintenance of ventilation systems and other engineering controls
- d) information and training given to workers
- e) purchase and maintenance of personal protective equipment and the instructions in its use
- f) co-ordination, supervision and monitoring of maintenance, renovation or demolition activities that may disturb asbestos

Design and installation

The materials, processes and equipment should be designed to eliminate exposure to airborne asbestos fibres or reduce exposure to the lowest practical level.

Work areas must be designed, built and maintained to:

- a) separate the hazardous operations from the remainder of the work areas
- b) reduce surfaces on which asbestos dust and waste may gather
- c) make cleaning floors, walls, ceilings and machinery easier
- d) aid collection of asbestos dust that escapes unintentionally

To avoid direct handling of asbestos or asbestos-containing materials, automatic processes or remote control systems should be used where practical.

Where appropriate, total process enclosures, which prevent the release of asbestos fibres, should be designed and constructed.

Total process enclosures should have exhaust ventilation equipped with a HEPA filter to create a negative pressure inside the enclosure.

Asbestos-containing building materials, such as boards, sheets and plates should be designed, prefabricated and packed in the workplace so that no further cutting, drilling or other machining of the material is required.

Local exhaust ventilation

Local exhaust ventilation equipment should be provided and maintained when total enclosure of the dust-proofing process is not practical.

The local exhaust ventilation must be located as close as possible to the location of release by the use of capture hoods, booths or enclosures.

All exhausted air must be passed through a HEPA filter and be discharged to the exterior of the building.

Openings in enclosures must be as small as possible while still allowing access to the necessary work operation.

Ventilation equipment must be constructed so that air turbulence and eddies created by the work process or by the workers do not impair the effective removal of dust.

Local exhaust ventilation or other effective methods should be used for workplace operations such as:

- a) feeding, conveying, crushing, milling, screening, mixing or bagging of asbestos materials
- b) carding, spinning, weaving, sewing and cutting of asbestos textiles
- c) cutting, punching, drilling, sawing, grinding or machining of asbestos cement and friction materials

The design of local exhaust ventilation must be performed by a technically qualified professional engineer.

Checks on the performance of the exhaust system must be made periodically with smoke tests or airflow measurements, or by comparing static pressure readings in the system with readings recorded at the same points when the system was known to be operating efficiently.

Asbestos dust collected by the filtration equipment must be removed regularly by way of safe work procedures.

All types of dust control equipment must be inspected by a technically qualified person.

General ventilation

The work area must be supplied with clean air to replace the exhausted air and to reduce the concentration of airborne asbestos fibres.

General ventilation should not be used to control exposure to airborne asbestos fibres unless local exhaust is also present.

The general ventilation flow rate must be able to change the workplace air at least four times per hour.

The exhausted air must pass through a HEPA filter and not be re-circulated back to the working environment, except under the following conditions:

- a) the concentration of airborne asbestos fibres is much less than the occupational exposure limit of 0.1 fibre per cubic centimetre of air and does not add to worker exposure
- b) the filtration and ventilation system is regularly checked and maintained
- c) the air quality is monitored by adequate instruments
- d) the director of the Workplace Safety and Health Division has approved the process

INFORMATION, LABELLING AND TRAINING

Labelling of products and risk areas

All containers of asbestos-containing materials or wastes must be labelled according to the *Hazardous Products Act (Canada)*, the Controlled Products Regulations and the Workplace Safety and Health Regulation.

All asbestos-containing materials, including waste, must be accompanied by a material safety data sheet or waste profile sheet containing similar information.

All asbestos or asbestos-containing materials must be clearly identified with signs, labels or other effective means.

The information on warning labels and signs must be understandable to the workers.

Education and Training

All workers who work with, or who work close to, asbestos or asbestos-containing materials, must be trained by the employer on:

- a) sources of asbestos exposure
- b) possible health effects
- c) information on the label
- d) information on the material safety data sheet
- e) safe work procedures for use, storage, handling and disposal of asbestos
- f) safe work procedures where asbestos is present
- g) safe work procedures in case of emergency involving asbestos

Workers must be informed about the significance of cigarette smoking as a risk factor in asbestos related diseases.

A written, oral, visual or worker-participation approach must be used to ensure workers are aware of health risks, methods of prevention and proper work procedures.

PERSONAL PROTECTIVE EQUIPMENT

Respirators

Respirators must be used only as a temporary or emergency measure, not as a long-term alternative to effective engineering control.

A suitable supply of respirators must be available in the workplace.

Respirators must be provided to all workers where the concentration of airborne asbestos fibres exceeds or is likely to exceed the occupational exposure limit of 0.1 fibre per cubic centimetre of air.

A respirator must not be shared unless it is cleaned and disinfected before a different worker uses it.

All respirators must be provided and maintained by the employer without cost to the worker.

Only those types of respirators tested and certified by the National Institute for Occupational Safety and Health (NIOSH) in accordance with the current edition Canadian Standards Association Standard CSA Z94.4 – 02, Selection, Use and Care of Respirators, or other device approved by the director of the Workplace Safety and Health Division may be used.

All air purifying respirators must be equipped with an N, P, or R 100 filter.

A respirator must be selected with an appropriate protection factor so that the wearer's exposure does not exceed 0.1 fibres per cubic centimetre of air.

The protection factors (adopted in CSA Standard Z94.4 – 02), presented in Table 1 of this guideline must be used when selecting a respirator.

The maximum use concentration for each type of respirator is listed in Table 2.

The employer must provide supervision to ensure that the respirator is properly used.

Workers required to wear a respirator must be adequately trained in the use, care and maintenance of that respirator.

Instruction must be given on:

- a) reasons for using the respirator
- b) when to use the respirator
- c) how the respirator works
- d) how to check for proper fit
- e) how to perform regular servicing

- f) the name of the respiratory protection program co-ordinator.

A record of training must be kept for each worker.

Respirators must be appropriately cleaned and serviced on a regular basis.

A suitable container, such as a metal box or polyethylene bag, must be provided to store individual respirators when not in use.

Respirators must be maintained according to procedures described in Canadian Standards Association Standard CSA Z94.4 – 02 and the manufacturer's specifications.

An ongoing record must be kept for each worker who is required to wear a respirator, listing the type of respirator issued, the dates on which it is cleaned and serviced and the dates of new filter installation.

Use of respiratory protection should be recorded on the monitoring records of exposure for that job.

Protective clothing

If personal clothing may be contaminated with asbestos, the employer must provide appropriate work clothing.

When the use of a respirator is required, protective clothing must also be provided and worn.

Protective clothing, including appropriate head covering, must completely cover all parts of the body.

Separate locker rooms must be provided to store contaminated protective clothing and clean personal clothing.

Workplaces where the concentration of airborne asbestos fibres is likely to exceed the occupational exposure limit must have a shower and washroom facility located between the contaminated work area and the clean locker rooms.

A vacuum cleaner equipped with a HEPA filter must be located at the entrance to the shower room where protective clothing is to be removed.

Regular inspection and cleaning of the shower and locker rooms must be performed to ensure they remain asbestos-free.

Protective clothing must not be worn outside the contaminated work area or locker rooms.

If protective clothing is to be reused, the employer must provide for the laundering of the protective clothing.

Reusable protective clothing must be laundered under controlled conditions to prevent the release of airborne asbestos fibres during handling, transport and laundering.

Contaminated protective clothing that is sent for laundering outside the workplace must be double-bagged in 6-mil polyethylene bags.

The polyethylene bags must be clearly identified as containing asbestos-contaminated clothing.

When a laundry company is contracted, the employer must ensure that the company fully understands the precautions necessary for handling asbestos-contaminated clothing.

The laundering of protective clothing in workers' homes is prohibited.

CLEANING OF WORKPLACE

General

Employers must ensure that work areas are kept as clean and free of asbestos waste as possible.

All equipment and building interiors must be kept free from the accumulation of asbestos dust.

Cleaning must be done by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Protective clothing and respirators must be worn when the cleaning process may include exposure to asbestos in excess of the occupational exposure limit.

When practical, cleaning should be done when no other workers are present.

When it is necessary for other workers to be present, those workers must also wear protective equipment.

Floors

Floors must be kept clean of accumulated asbestos and waste materials.

Floor cleaning must be done by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Floor surfaces must be kept in good repair.

Cracked or broken floor surfaces must be repaired.

Concrete surfaces should be treated to produce a surface that can be effectively cleaned.

Walls

New buildings should be constructed with smooth walls.

Walls of existing buildings should be made as smooth as is practical.

Walls should be cleaned with a vacuum cleaner equipped with a HEPA filter or by another means that does not create airborne asbestos.

Ensure wastewater does not dry out before disposal.

Machinery and equipment

Cleaning should be done, wherever practical, by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, or wet wiping.

Where machinery is fitted with exhaust ventilation equipment, the ventilation equipment must be operating while cleaning is done.

Overhead structures

Overhead structures of new buildings should be constructed with smooth surfaces and high ledges should be avoided.

Accumulated asbestos and waste material should be removed by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Polyethylene sheeting should be used to cover equipment and surfaces below when overhead cleaning is done.

Vacuum cleaning equipment

Use only a vacuum clean equipped with a HEPA filter for collecting asbestos dust and waste. The vacuum cleaner must be designed to keep the dust from escaping back into the workplace.

The vacuum bags should be disposable.

The vacuum cleaner must be removed from the workplace immediately if the vacuum bag bursts.

All burst bags and their contents must be double-bagged in 6-mil polyethylene bags by an operator wearing protective clothing and respiratory equipment.

The interior of the vacuum cleaner must then be cleared of asbestos with the use of another a vacuum cleaner equipped with a HEPA filter or by wet wiping.

The collected material must be disposed of according to the requirements of this guideline.

ASBESTOS CEMENT

Finishing operations within the workplace

All high speed sawing, drilling, sanding or milling equipment must be fitted with a local exhaust system equipped with a HEPA filter.

Low volume, high velocity air systems are usually the most suitable for this purpose.

The equipment should be designed to remove loose asbestos waste from the cut edges.

All unfinished edges of asbestos cement boards should be treated with a sealing solution.

Where practical, only hand tools or slow-running tools that produce coarse particles or chips should be used rather than high-speed machines or those that cut by grinding or scraping the material.

Abrasive or masonry discs should not be used for cutting asbestos material.

FRICION MATERIALS

Use of friction material in workshops

Where practical, friction materials should be supplied prefabricated, machined or drilled to requirements.

Where practical, hand tools or slow-running tools that produce coarse dust or chips should be used rather than high-speed machines or those that cut by grinding or scraping the material.

Fixed workstations or machines should have an effective local exhaust ventilation system installed.

Portable tools should be fitted with built-in local exhaust units.

Low-volume, high-velocity systems are the most appropriate for this purpose.

All local exhaust ventilation systems must be fitted with HEPA filters.

Dust extraction equipment should be installed at workstations where linings, blocks and clutch facings are riveted.

All exhaust ventilation equipment should be inspected and tested by a competent person at regular weekly intervals.

A record of every inspection should be kept.

Servicing of brakes and clutches in garages and workshops

Dust from brake and clutch assemblies must not be removed by blowing compressed air or by dry brushing when worn friction materials are being removed, except when this is done within an extraction box equipped with local exhaust ventilation.

Dust should be removed with a vacuum cleaner equipped with a HEPA filter.

If a vacuum cleaner equipped with a HEPA filter is not available, dust must be removed with a cloth moistened with a dust suppressant.

Where practical, friction materials should be cut to length with shears.

Power saws or abrasive discs must not be used unless the equipment is equipped with effective local exhaust ventilation.

Where products are machined, an effective local exhaust ventilation system must be installed.

All local exhaust ventilation systems must be fitted with HEPA filters.

Before applying adhesive to bond segments to brake shoes, surface dust should be removed with a cloth moistened with a dust suppressant.

Dust must not be removed by tapping or by blowing compressed air.

Loose cuttings and dust should be removed from the workplace by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping..

Waste disposal

Loose cuttings, dust collected from fabrication processes and broken and worn linings must be doubled-bagged in 6-mil polyethylene bags.

Bags containing asbestos waste must be disposed of according to the requirements of this guideline.

DISPOSAL OF ASBESTOS WASTE

Waste minimization

Effective production techniques must be used to minimize the creation of asbestos waste.

Loose fibre, cuttings and floor sweepings

Loose fibre collected by fixed extraction systems should be returned to the production process.

Cuttings accumulating around and under machinery should be collected by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Loose material collected by other means should be double-bagged in 6-mil polyethylene bags.

Waste materials from repairing or removing thermal insulation

Asbestos waste must be placed in suitable containers immediately on removal.

Polyethylene bags must not be used where debris may puncture the bag.

Where polyethylene bags are used, the waste must be double-bagged in 6-mil polyethylene bags.

Full containers must be sealed immediately to prevent the escape of airborne asbestos fibres.

Asbestos waste must not be allowed to dry out on floors or other surfaces of the work area.

The external surface of all containers must be cleaned with a vacuum cleaner equipped with a HEPA filter or by wet wiping.

The cleaned containers should be removed to an area set aside for such waste.

The containers and the waste storage area must be clearly identified as containing asbestos.

Non-friable asbestos materials

The requirements below do not apply to vinyl asbestos floor tiles or sheets if the abatement procedure established in this guideline is followed.

Non-friable asbestos waste, including ceiling tiles, gaskets, seals, packing, construction mastics, panels, siding, shingles, wallboard, brake shoes and clutch plates, asbestos cement products and joint compounds must be stored in a way to ensure that asbestos fibres will not become airborne while awaiting disposal.

Non-friable asbestos waste must be double-bagged in 6-mil polyethylene bags, wrapped in 6-mil polyethylene sheeting or placed into another suitable, solid container.

Wherever practical, machine design should include automatic removal and collection of scraps in a disposable container that can be sealed and removed.

Breaking down scraps and rejects for disposal must take place in an area with effective local exhaust ventilation.

Non-friable asbestos waste should be wetted in order to minimize the creation of airborne asbestos fibres.

Labelling and isolation of waste

All containers of asbestos waste must be labelled according to section 35.23 of the workplace safety and health regulation.

The label on containers of asbestos waste should include:

- a) a product identifier
- b) information for the safe handling of the controlled product
- c) a statement that a material safety data sheet or waste profile sheet for the controlled product is available

Asbestos waste awaiting disposal must be stored so that waste containers will not be damaged.

Asbestos waste must not be mixed with other wastes having no special disposal requirements.

Transport of waste

Asbestos waste must be transported to the disposal point in a way that no airborne asbestos fibres are released into the air during transport.

All vehicles used for the transport of asbestos waste must be cleaned after unloading by using a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Cleanup procedures must be carried out immediately in the event of accidental spillage during transport to the disposal site.

When the amount of spilled material is small, the waste should be collected into its original container and reloaded immediately.

If the amount of spilled material is substantial and the material may become airborne, it must be wetted and covered immediately.

Workers performing the cleanup of a substantial spill must wear protective clothing and respiratory protection equipment.

Written instructions on the actions to be taken in the event of an accidental spill must be issued to drivers of vehicles carrying asbestos waste.

Procedure at the disposal site

Approval for the disposal of asbestos waste at a disposal site must be obtained from the municipal authority, Manitoba Conservation and Manitoba Labour and Immigration (Workplace Safety and Health, phone: 204-945-3446) before a disposal site is used.

The disposal site chosen must have vehicular access to the working face or to a hole or trench dug specifically to receive the asbestos waste.

The waste should be deposited at the foot of the working face of the landfill site or at the bottom of an excavation dug to receive it.

Ensure that bags or containers are not broken when the waste is being disposed of.

All friable waste must be:

- a) covered to a depth of 20 to 25 centimetres as soon as possible
- b) covered to a minimum depth of 2 metres by the end of a working day

Ensure that non-friable waste deposited on a dry site is not broken by vehicles moving over it.

Vehicles, reusable containers and covers that have been in contact with asbestos waste must be cleaned after use by using a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping, or wet wiping.

Employers must provide suitable protective clothing, respiratory equipment and training for workers who are involved in collecting, transporting or disposing of asbestos waste.

PROCEDURES FOR REMOVING ASBESTOS

General

The presence, type and friability of asbestos should be confirmed before planning to remove or repair building materials thought to contain asbestos.

All friable asbestos that may be disturbed in a building must be removed before demolition is performed in that building or location.

The building owner, employer or contractor should review building codes or other applicable codes prior to asbestos removal to determine if the activity is regulated by those codes.

The building owner or employer must notify all workers who may be exposed when friable asbestos is likely to be disturbed or when work is to be carried out on or near friable asbestos.

Asbestos-containing material should be considered for removal:

- a) when it is breaking away from the surface to which it is applied
- b) when the material is likely to be damaged
- c) when the asbestos is friable
- d) when the concentration of airborne asbestos fibres is above the occupational exposure limit
- e) prior to renovation or demolition

Classification of work

In this guideline, work that may result in worker exposure to asbestos is classified as Type 1 (low risk), Type 2 (medium risk) or Type 3 (high risk).

Type 1 removal includes:

- a) installation or removal of non-friable manufactured products that contain asbestos, such as vinyl asbestos floor tiles or sheets, ceiling tiles, gaskets, seals, packing, construction mastics, cementitious asbestos-containing Transite panels, siding, shingles and wallboard, brake shoes, clutch plates or asbestos cement products
- b) cutting or shaping asbestos-containing materials mentioned in (a) above with hand tools only
- c) cutting, grinding, drilling, sanding or scraping of asbestos-containing materials mentioned in (a) above with a power tool equipped with a HEPA filter

Type 2 removal includes:

- a) removal of part or all of a false ceiling where there is friable asbestos material lying on the surface of the false ceiling

- b) enclosure of friable asbestos-containing material
- c) minor removal or disturbance of less than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of a building, any machinery or equipment (other than air-handling equipment in a building which has sprayed asbestos fireproofing) that can be completed within a three hour period
- d) any other abatement not mentioned as a Type 1 or Type 3 abatement that may result in a worker exposure to airborne asbestos fibres in excess of the occupational exposure limit of 0.1 fibre per cubic centimetre of air

Type 3 removal includes:

- a) removal of greater than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of a building, machinery or equipment
- b) removal or disturbance of less than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of a building, machinery or equipment that cannot be completed within a three hour period
- c) spray application of a sealant or encapsulant to greater than one square metre of friable asbestos-containing material
- d) cleaning or removal of air-handling equipment, including rigid ducting, in a building which has sprayed asbestos fireproofing
- e) repair, alteration or demolition of equipment made in part of refractory materials containing asbestos
- f) grinding, cutting, drilling, sanding or scraping any asbestos-containing material involved in Type 1 work abatement with a power tool not equipped with a HEPA filter

Procedures for Type 1 Removal

Eating, drinking, chewing or smoking is prohibited in the work area.

All asbestos dust and contaminated debris must be removed by a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping or wet wiping. Compressed air must not be used to clean up or remove dust and debris from contaminated surfaces.

Wet handling techniques must be used to control dust on the surfaces of any asbestos-containing materials mentioned in Type 1 removal unless wetting creates a hazard or causes damage.

Where the surfaces mentioned above cannot be wetted, a vacuum cleaner equipped with a HEPA filter or other method that does not create airborne asbestos fibres, must be used to control the spread of dust.

The spread of asbestos from the work area must be controlled by appropriate methods, including the use of polyethylene sheeting.

The polyethylene sheeting mentioned above must be frequently cleaned with the use of a vacuum cleaner equipped with a HEPA filter, or wetted, to control the spread of asbestos.

The polyethylene sheeting mentioned above must be double-bagged in 6-mil polyethylene bags and disposed of as asbestos waste at the end of the removal activity.

An employer must provide appropriate respiratory protection and protective clothing to any worker who requests such equipment on reasonable grounds.

Hand and face washing facilities must be available for workers in the work area, and workers must wash before leaving the work area.

The following procedures must be used for removing vinyl asbestos flooring material:

- a) Resilient flooring material and tiles, including the backing material and adhesive, must be assumed to contain asbestos if it was manufactured before 1980, unless the material has been analyzed using a method specified in this guideline, and proven not to contain asbestos.
- b) Rip-up of vinyl asbestos flooring is prohibited.
- c) Sanding and cutting of the vinyl asbestos flooring surface, backing material or adhesive with high rpm equipment is prohibited unless performed as a Type 2 or Type 3 abatement.
- d) Mechanical chipping is prohibited unless performed as a Type 2 or Type 3 abatement.
- e) Sheet flooring must be cut into strips with a width not more than 15 centimetres.
- f) If possible, tiles must be removed intact.
- g) The strips, or tiles, and backing must be wetted and then scraped up with the use of a scraper, shovel, trowel or other hand tools.
- h) Wetting is not needed for tiles that are heated and removed intact.
- i) Residual adhesive and backing material must be scraped off under wet conditions.
- j) The removed strips or tiles, backing material and adhesive must be immediately double-bagged in 6-mil polyethylene bags, securely tied and disposed of as asbestos waste.
- k) All debris must be cleaned up using a vacuum cleaner equipped with a HEPA filter, or by wet mopping, wet sweeping or wet wiping, and disposed of as asbestos waste.
- l) Dry sweeping is prohibited.

The following procedures must be used for removing cementitious asbestos-containing Transite panels, siding, shingles and wallboard:

- a) Grinding, cutting, drilling, sanding or scraping the asbestos-containing material mentioned above with a power tool is prohibited unless the power tool is equipped with a HEPA filter.
- b) The asbestos-containing material mentioned above must be wetted prior to removal.
- c) Ensure the material is removed with minimal breakage.
- d) Above-mentioned materials are to be handled in either of two ways:
 - i. immediately lowered to the ground, in a manner which will not break the material and then either wrapped in polyethylene sheeting or double-bagged in 6-mil polyethylene bags and disposed of as asbestos waste
 - ii. wrapped in polyethylene sheeting or double-bagged 6-mil polyethylene bags immediately and lowered to the ground by the end of the shift and disposed of as asbestos waste

Procedures for Type 2 Removal

Eating, drinking, chewing or smoking is prohibited in the work area.

The contaminated area must be identified by clearly visible signs warning of the asbestos work and hazards.

Before any work is performed, all asbestos dust and contaminated debris must be removed using a vacuum cleaner equipped with a HEPA filter or by wet mopping, wet sweeping or wet wiping.

Compressed air must not be used to clean up or remove dust and debris from contaminated surfaces.

When a Type 2 removal is done indoors and walls do not enclose the work, the spread of asbestos must be prevented by the constructing a small walk-in negative pressure enclosure to fit no more than two persons.

The negative pressure enclosure must be constructed of two layers of a minimum of 6-mil polyethylene, or other suitable material, with reinforced polyethylene on the floor.

The negative pressure enclosure must be kept at a minimum pressure differential of -0.02 inches of water gauge relative to the air outside of the enclosure at all times during the work by use of a vacuum cleaner equipped with a HEPA filter or a similar ventilation unit.

All mechanical ventilation in the contaminated area must be disabled, except for the ventilation required to maintain the negative pressure.

At least two layers of 6-mil polyethylene must be placed over all openings in the contaminated area.

Wet handling procedures must be used to control dust from asbestos-containing materials unless wetting creates a hazard or causes damage.

Electrical circuits inside the contaminated area must be deactivated unless equipped with ground-fault circuit interrupters.

If the surfaces mentioned above cannot be wetted, a vacuum cleaner equipped with a HEPA filter, or other means that does not create airborne asbestos fibres, must be used to control the spread of dust.

All dust and waste containing asbestos must be cleaned up frequently during the work and immediately when work is completed by wet sweeping or wet mopping and must be double-bagged in 6-mil polyethylene bags, securely tied and disposed of as asbestos waste.

All surfaces inside the negative pressure enclosure must be wet wiped before dismantling the negative pressure enclosure.

All polyethylene sheets used to form the negative pressure enclosure and covering all openings inside the contaminated area must be folded to contain any remaining debris and double-bagged in 6-mil polyethylene bags, securely tied and disposed of as asbestos waste.

Only persons wearing protective clothing and respiratory protection are allowed to enter the contaminated area.

Unless personal monitoring is done inside the contaminated area to determine the actual exposure to airborne asbestos fibres, and an appropriate respirator is selected from Table 2, all persons inside the contaminated area must wear at a minimum either:

- a) a full face powered air purifying respirator with HEPA cartridges while working on wetted asbestos-containing materials
- b) a full face supplied air respirator or self-contained breathing apparatus, complete with a reserve escape bottle, operating in the continuous flow mode while working on dry asbestos-containing materials

All persons must decontaminate their protective clothing and respirators by using a vacuum cleaner equipped with a HEPA filter or by wet wiping after completing the work and before leaving the contaminated area.

Contaminated protective clothing that will not be re-used must be disposed of as asbestos waste.

Hand and face washing facilities must be available to workers in the work area and workers must wash before leaving the work area.

A glovebag may be used to remove asbestos-containing material from piping as follows:

- a) The glovebag must be made of a minimum of 6-mil polyethylene and must be seamless at the bottom.
- b) The glovebag must be disposed of when full and not be re-used.
- c) Before beginning work, all insulation must be wetted with amended water.
- d) Insulation material that has fallen from the pipe must be cleaned up by using a vacuum cleaner equipped with a HEPA filter, or by wet mopping or wet sweeping, prior to attaching the glovebag.
- e) All damaged areas of the pipe must be wrapped with polyethylene prior to removal.
- f) A glovebag properly designed for each task must be used.
- g) Preformed insulation blocks must be cut at the joints to minimize fibre generation.
- h) Exposed insulation must be wetted frequently during work.
- i) Contaminated tools must be removed in an inverted glove for transfer to the next glovebag.
- j) Accumulated debris must be cleaned up prior to removing the glovebag.
- k) Stable elevated platforms and scaffolding must be provided where needed.
- l) Where the insulation is not fully wrapped with polyethylene, the insulation must be banded with tape at the places where the glovebag is to be attached, to provide a clean surface for affixing the tape that seals the glovebag and to prevent damage to the insulation when the sealing tape is removed.
- m) A smoke test should be performed inside the glovebag periodically to assure that the glovebag has been installed correctly.
- n) Care must be taken when metal bands, wires or metal jacketing are encountered to avoid lacerations to the hands or to the glovebag.
- o) Whenever possible, sharp edges must be folded in and the items placed in the bottom of the bag.
- p) The accumulation of debris and water in the glovebag must not exceed the ability of the workers to handle the glovebag safely.
- q) A vacuum cleaner equipped with a HEPA filter must be used to remove the air inside the glovebag to ensure that no asbestos fibres are released during bag opening procedures.
- r) The ends of the insulation must be sealed with an encapsulating material when partial removal creates exposed ends.
- s) The work area must be decontaminated by using a vacuum cleaner equipped with a HEPA filter, or by wet wiping, wet sweeping or wet mopping, after the completion of the removal.
- t) Removal of pipe insulation from salvaged or reclaimed pipe must be

done in an enclosure or room with suitable controls to prevent the release of airborne asbestos fibres to the environment.

- u) Where outdoor work is performed, barricades must be placed around the work area.

Procedures for Type 3 Removal

Before any Type 3 removal is done, the contractor or employer must notify the Workplace Safety and Health Division in writing at least five working days before the start of work and must include:

- a) the name, address and telephone number of the person giving notice
- b) the name, address and telephone number of the owner of the building, or agent of the owner, where the work will be performed
- c) the address or municipal location of the building where the work will be performed
- d) the name, address and telephone number of the company performing the work
- e) a description of the work to be performed
- f) the start date and expected completion date of the work
- g) the name, address and telephone number of the supervisor in charge of the work

Eating, drinking, chewing or smoking is prohibited in the work area.

Before starting work, suitable barriers and clearly visible signs warning of the asbestos work and hazards must be set up at a distance from the work site.

Before any work is performed, all asbestos dust and contaminated debris must be removed by wet mopping, wet sweeping, wet wiping or using a vacuum cleaner equipped with a HEPA filter.

Compressed air must not be used to clean up or remove dust and debris from contaminated surfaces.

Movable equipment within the work area must be cleaned by wet wiping or with a vacuum cleaner equipped with a HEPA filter and then removed from the work site.

Fixed equipment within the work area must be cleaned by wet wiping or with a vacuum cleaner equipped with a HEPA filter and then covered with impermeable sheeting and sealed with tape.

When Type 3 removal is done indoors and walls do not enclose the operation, the spread of asbestos from the work area must be prevented by the construction of a negative pressure enclosure.

The negative pressure enclosure must be constructed of two layers of a minimum of 6-mil polyethylene or other suitable material, with reinforced polyethylene on the floors.

The negative pressure enclosure must have at least four air changes per hour and a minimum pressure differential of -0.02 inches of water gauge relative to the air outside of the enclosure must be maintained.

The negative pressure enclosure must be kept under negative pressure for the duration of the work.

All air exhausted from the negative pressure enclosure must be passed through a HEPA filter and then be vented to the outside of the building.

All mechanical ventilation in the contaminated area, except for the ventilation required to provide the negative air pressure, must be disabled and a barrier of at least two layers of 6-mil polyethylene placed over all openings in the contaminated area.

All openings from the contaminated area, including windows and doors, must be adequately sealed with adhesive tape or isolated by two layers of 6-mil polyethylene sheeting.

Ensure that asbestos dust cannot escape at points where pipes and conduits pass out of the working area.

All entry points to the work site must have highly visible warning notices that identify an asbestos activity and forbid entry to anyone not wearing appropriate respiratory protection and protective clothing.

A worker decontamination unit must be connected to the work site, or as close as practical to the work site.

The worker decontamination unit must consist of a series of interconnecting rooms including:

- a) a clean room suitable for changing into or out of street clothes and for storing clean clothing and equipment
- b) a shower room
- c) an equipment room suitable for changing into protective clothing and for storage of contaminated protective clothing and equipment

The worker decontamination unit must be constructed so that overlapping curtains of polyethylene sheeting or other suitable material are fitted to each side of the entrance or exit to each room.

The worker decontamination unit must be arranged in sequence and constructed

so that every person entering or leaving the work area must pass through each room of the decontamination unit.

The shower room in the worker decontamination unit:

- a) must have an adequate supply of hot and cold water or water of a constant temperature that is not less than 40 C or more than 50 C
- b) must have individual controls inside the room to regulate water flow or temperature if there is hot and cold water
- c) must have clean towels

To ensure asbestos will not escape, the negative pressure enclosure must be tested daily by using techniques such as:

- a) Operating a smoke generator inside the enclosure and watching for visible smoke outside the enclosure
- b) using a recording manometer to ensure that a minimum pressure differential of -0.02 inches of water gauge relative to the air outside of the enclosure is being maintained at all times
- c) daily perimeter air monitoring to ensure that background concentrations of airborne asbestos fibres are not exceeded

A competent person must inspect the work area for defects in the enclosure or barriers and inspect the worker decontamination unit:

- a) at the beginning of each shift
- b) at the end of a shift where there is no shift beginning immediately following the shift that is ending
- c) at least once each day on days when there are no shifts

Any defect found on inspection must be repaired immediately and no work, other than necessary repair work, shall be done in the contaminated area until the repair work is completed.

Only persons wearing appropriate protective clothing and respiratory protection are allowed to enter the contaminated work area.

Unless personal monitoring is performed inside the contaminated work area to determine the actual exposure to airborne asbestos fibres and an appropriate respirator is selected from Table 2, all persons inside the contaminated area must wear at a minimum one of:

- a) a full face powered air purifying respirator with N, P, or R 100 cartridges while working on wetted asbestos-containing materials
- b) a full face supplied air respirator or self-contained breathing apparatus, complete with a reserve escape bottle, operating in the continuous flow mode while working on dry asbestos-containing materials

Workers entering the work area must:

- a) enter the clean room of the worker decontamination unit, remove all

- street clothing, store it in the lockers provided and put on clean, appropriate respiratory protection and protective clothing
- b) pass through the shower room to the equipment room
- c) leave the equipment room to enter the work area

Workers leaving the work area must:

- a) remove visible contamination from their protective clothing and respiratory protection in the work area
- b) enter the equipment room of the worker decontamination unit and remove all loose asbestos fibre from their respiratory protection equipment with the use of a HEPA filter equipped vacuum cleaner
- c) if the protective clothing will be reused, remove all asbestos fibres from work clothing with HEPA filter equipped vacuum cleaner, then remove all clothing and store it in a suitable manner
- d) where the protective clothing is not intended to be reused, double-bag it in 6-mil polyethylene bags and dispose of it as asbestos waste
- e) pass into the shower room and shower thoroughly without removing the respiratory protection
- f) remove and thoroughly clean the respiratory protection equipment, store it appropriately
- g) pass into the clean area, dry, dress and leave through the clean area door

Where it is not practical to attach the worker decontamination unit to the work area and passage through a non-contaminated zone is necessary, a two-room worker decontamination unit must be located at both the work site and at the remote worker decontamination unit, and the following procedure used to enter and exit the area:

- a) when starting work, workers must:
 - i. enter the clean room of the remote worker decontamination unit, remove all street clothing, store it in the lockers provided and put on appropriate clean protective clothing
 - ii. pass through the shower room and proceed to the decontamination unit attached to the work site
 - iii. enter the clean room of the worker decontamination unit attached to the work site and put on appropriate respiratory protection
 - iv. pass through the equipment room and enter the work area
- b) at the end of work workers must:
 - i. remove visible contamination in the work area
 - ii. enter the equipment room of the worker decontamination unit attached to the work area and remove all asbestos fibre from respiratory protection using a HEPA filter equipped vacuum cleaner
 - iii. if the protective clothing will be reused, remove all asbestos fibres from work clothing with HEPA filter equipped vacuum cleaner, then remove all clothing and store it in a suitable manner

- iv. where the protective clothing is not intended to be reused, double-bag it in 6-mil polyethylene bags and dispose of it as asbestos waste
- iii. proceed into the clean room, put on appropriate clean protective clothing, remove the respiratory protection and store it appropriately
- iv. proceed immediately to the remote worker decontamination unit
- v. enter the shower area of to the remote worker decontamination unit, remove protective clothing and shower thoroughly
- vi. pass into the clean area, dry, dress in street clothes and leave through the clean area

Electrical circuits inside the contaminated area must be deactivated unless equipped with ground-fault circuit interrupters.

Wet handling techniques must be used to control dust from asbestos-containing materials unless wetting creates a hazard or causes damage.

Dry stripping may produce very high levels of airborne asbestos fibres and should therefore be used only:

- a) where wet methods may be hazardous to workers
- b) where live electrical apparatus might be made dangerous by contact with water
- c) where hot metal is to be stripped and the use of water may be damaging

Where the surfaces mentioned above cannot be wetted, a vacuum cleaner equipped with a HEPA filter or another means that does not create airborne asbestos fibres must be used to control the spread of dust.

All waste containing asbestos must be cleaned up frequently during work, and immediately after work is completed, by wet sweeping or wet mopping. Waste must be double-bagged in 6-mil polyethylene bags and disposed of as asbestos waste.

Waste containing asbestos must be kept wet.

If the surfaces mentioned above cannot be wetted, a vacuum cleaner equipped with a HEPA filter, or other means that does not create airborne asbestos fibres, must be used to control the spread of dust.

All bags of waste asbestos and contaminated protective clothing must be removed from the work area through a waste decontamination unit connected to the negative pressure enclosure.

The waste decontamination unit must consist of a series of interconnecting rooms including:

- a) a container clean room
- b) a holding room
- c) a transfer room

The waste decontamination unit must be constructed so that overlapping curtains of polyethylene sheeting or other suitable material are fitted to each side of the entrance or exit to each room.

Bags of asbestos waste and contaminated protective clothing must be removed from the work area by the following procedure:

- a) Remove any contamination visible on the outsides of bags in the work area.
- b) Transfer the bags into the container cleaning room.
- c) Clean the outsides of bags with a damp cloth or sponge, place each bag into a second 6-mil polyethylene bag, seal the outer bag and transfer the double-bagged waste to the holding room.
- d) Worker(s) performing the activities described in (b) and (c) must wear the same protective clothing and respiratory protection as those workers in the contaminated work area.
- e) Workers performing the activities described in (b) and (c) must exit by the worker decontamination unit.
- f) The double-bagged waste is then moved from the holding room to the container clean room, without entering the holding room, and then outside the waste decontamination unit by a worker who enters from the waste container clean room.
- g) Workers performing the activity described in (f) do not require respiratory protection or protective clothing.

Contaminated equipment, tools and other items used in the work area must be cleaned with a damp cloth, vacuumed with a vacuum equipped with a HEPA filter and removed from the work area through the waste decontamination unit by the same method as described for asbestos waste.

Before the negative pressure enclosure, worker decontamination unit, and waste decontamination unit may be removed or altered:

- a) The contaminated areas must be decontaminated by a combination of wet cleaning and vacuuming with vacuum cleaner equipped with a HEPA filter.
- b) There must be no visible trace of asbestos dust.
- c) A final air monitoring clearance test of the area inside the negative pressure enclosure must be performed and the concentration of airborne asbestos fibres inside the enclosure must not exceed 0.01 fibres per cubic centimetre.

All polyethylene sheets used to form the negative pressure enclosure, the worker decontamination unit(s), the waste decontamination unit and the polyethylene

sheets covering all openings inside the contaminated area must be folded to contain any remaining debris, double-bagged in 6-mil polyethylene bags, securely tied and disposed of as asbestos waste.

When a Type 3 abatement is being done out-of-doors, the procedures described in this section must be followed, with the exception of the building and operating of a negative pressure enclosure, worker decontamination unit and waste decontamination unit.

MEDICAL SURVEILLANCE

General requirements

Employers must operate a medical surveillance program featuring pre-placement and periodic follow-up examinations for all workers:

- a) exposed to an airborne concentration of asbestos in excess of 0.1 fibre per cubic centimetre (the OEL)
- b) believed to be exposed to asbestos for at least 100 hours in a consecutive 12 month period

The medical examinations and procedures must be conducted by, or under the supervision of, a licensed physician.

The medical examinations must be conducted at no cost to the worker, and at a reasonable time and place.

The attending physician must report the development of any significant signs and symptoms or radiographic changes to the chief occupational medical officer of the Workplace Safety and Health Division.

Pre-placement examination

The pre-placement examination must include:

- a) a screening chest radiograph
- b) a lung function test, including:
 - i. FEV₁
 - ii. FVC
 - iii. recording for at least 10 seconds
 - iv. written trace
- c) a medical examination
- d) an occupational exposure history
- e) a respiratory health questionnaire

Periodic follow-up examination

The periodic follow-up examination must include:

- a) a screening chest radiograph (every 5 years; if worker has been exposed over 20 years, the requirement is every 2 years)
- b) a lung function test as above (annually)
- c) an occupational exposure history (annually)
- d) a health questionnaire (annually)

APPENDIX A

TABLE 1
Assigned Protection Factors

Type of Respirator	Type of Facepiece			
	Half Face	Full Face	Helmet/Hood	Loose Fitting Facepiece
Air Purifying (HEPA)	10	100 (10 if QLFT)		
Supplied-air				
SCBA (Demand)*	10	100 (10 if QLFT)		
Airline (Demand)*	10	100 (10 if QLFT)		
Powered Air Purifying	50	1000**	1000	25
Supplied-air				
pressure demand	50	1000	--	--
continuous flow	50	1000	--	--
SCBA (Pressure Demand or Open/Closed Circuit)	--	***	--	--

* Demand-type respirators must not be used in IDLH situations.

** Positive-pressure SCBA is presently believed to provide the most protection. Limited recent simulated workplace studies have concluded that all users may not be able to achieve protection factors of 10,000. Based upon this limited data, a definitive assigned protection factor could not be assigned for positive-pressure SCBA. When potential hazardous concentrations can be estimated, an assigned protection factor of no greater than 10,000 should be used.

QLFT = Qualitative fit testing

APPENDIX B

TABLE 2

Maximum Use Concentration (fibres/cc)

Type of Respirator	Type of Facepiece			
	Half Face	Full Face	Helmet/Hood	Loose Fitting Facepiece
Air Purifying (negative pressure)	1	10 (1 if QLFT)		
Supplied-air				
SCBA (demand)	1	10 (1 if QLFT)		
airline (demand)	1	10 (1 if QLFT)		
Powered Air Purifying	5	100	100	2.5
Supplied-air				
pressure demand	5	100	--	--
continuous flow	5	100	--	--
SCBA (Pressure Demand or Open/Closed Circuit)	--	--	--	--

