

PHASE 2 REPORT ASBESTOS-CONTAINING VERMICULITE CAPE BRETON PUBLIC HOUSING



Prepared for:

**Nova Scotia Department of Transportation and Public Works,
and the
Nova Scotia Department of Community Services**

**Pinchin LeBlanc Environmental Limited
Project # 01-6358**

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EXECUTIVE SUMMARY

Pinchin LeBlanc Environmental Limited (PLEL) has been retained by the Nova Scotia Department of Transportation and Public Works and the Nova Scotia Department of Community Services (DCS), to provide consulting services related to asbestos-containing vermiculite insulation in Cape Breton Public Housing. The services relate to the discovery of asbestos-containing vermiculite insulation in housing units located in Whitney Pier and Ashby Terraces in Sydney, Nova Scotia. In response to a Compliance Order from Nova Scotia Environment and Labour, the Cape Breton Island Housing Authority (CBIHA) undertook steps to address the vermiculite issue including retaining the services of Atlantic Indoor Air Audit Co./HEPA Atlantic (Atlantic Indoor).

PLEL's mandate included several phases of work. The initial component, termed "Phase I" of the assignment, included an audit/review of actions taken by CBIHA and their advisors. The PLEL Phase I Report was submitted in July of 2006. Sufficient information was gathered during the Phase 1 review process to allow PLEL to prepare and present the Phase 2 Report.

The Phase 2 report is intended to provide the Department of Community Services with options for both the short term and long term management of the insulation within the housing units. PLEL has provided 4 options, removal, encapsulation, enclosure, and surveillance with a management program. PLEL has provided advantages and disadvantages associated with each of the options, estimated costs have been provided for 2 options that are considered by PLEL to be more appropriate for the Cape Breton housing units. The 2 options that PLEL feels are appropriate for the Cape Breton housing units are removal or surveillance with a management program. Of the 2 options suggested each will have financial and management implications; removal would be permanent solution with higher costs initially; surveillance with a management program would be considered a long term option with lower costs initially, however in the event of demolition or major renovations, removal maybe required at some point in the future. In the interim, costs will be incurred to manage the insulation for as long as the insulation remains in the units.

PLEL considers surveillance with a management program to be the more appropriate option for the Whitney Pier and Ashby Terraces, including the two 10-unit apartment buildings. In establishing this option PLEL based this on the safety and technical feasibility related to worker and occupant safety, not the cost. In addition, a number of the elements associated with establishing a surveillance and management program have already been implemented by CBIHA. Should the Department choose this option it will need to consider the long term implications that this program will have on CBIHA, its staff, tenants as well as contractors retained by CBIHA to conduct various services within the buildings.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION/BACKGROUND	1
2.0 PHASE 1 REPORT	1
3.0 PHASE 2 REPORT	2
3.1 Evaluation Criteria	2
3.1.1 Condition	3
3.1.1.1 Whitney Pier and Ashby Terraces Family Units	3
3.1.1.2 Whitney Pier and Ashby Terraces 10 Unit Apartment Buildings	4
3.1.2 Accessibility	4
3.1.2.1 Plug and Switch Plates (Whitney Pier and Ashby Terraces Family Units)	5
3.2 Hazard Evaluation In The Event Of Renovations, Maintenance or Demolition	5
3.3 Corrective Measures and Options	6
3.3.1 Removal	6
3.3.2 Encapsulation	7
3.3.3 Enclosure	7
3.3.4 Surveillance with a Management Program	7
3.4 Costs for Asbestos Abatement Strategies (All Options)	8
3.4.1 Removal	8
3.4.1.1 Whitney Pier and Ashby Terraces (80 Family Units)	8
3.4.1.2 Ten Unit Apartment Buildings (Whitney Pier and Ashby Terraces)	10
3.4.2 Encapsulation	11
3.4.3 Enclosure	11
3.4.4 Surveillance with a Management Program	11
4.0 SHORT TERM AND LONG TERM MANAGEMENT OF ASBESTOS-CONTAINING MATERIALS	14
4.1 Removal	14
4.1.1 Advantages of Removal	14
4.1.2 Disadvantages of Removal	14
4.1.3 General Comments on Removal	14
4.2 Encapsulation	15
4.2.1 Advantages of Encapsulation	15
4.2.2 Disadvantages of Encapsulation	15
4.2.3 General Comments on Encapsulation	15
4.3 Enclosure	15
4.3.1 Advantages of Enclosure	15
4.3.2 Disadvantages of Enclosure	15
4.3.3 General Comments on Enclosure	15
4.4 Surveillance with an Asbestos Management Program (AMP)	16
4.4.1 Advantages the AMP	16
4.4.2 Disadvantages of the AMP	16
4.4.3 General Comments on Surveillance and the AMP	16
5.0 SAMPLING PROGRAMS	16
6.0 CONCLUSIONS	17

1.0 INTRODUCTION/BACKGROUND

Pinchin LeBlanc Environmental Limited (PLEL) has been retained by the Nova Scotia Department of Transportation and Public Works and the Nova Scotia Department of Community Services to provide consulting services related to asbestos-containing vermiculite insulation in Cape Breton Public Housing. The services to be provided are specific to asbestos-containing vermiculite insulation confirmed by previous testing to be present within housing units at both the Whitney Pier and Ashby Terraces in Sydney, Nova Scotia.

In summary, the services to be provided include (but are not necessarily limited to):

Phase 1 Report:

Conducting an audit/review of the processes taken to date and prepare a report with findings and recommendations.

Phase 2 Report:

- .1 Develop criteria that can be used to evaluate the Cape Breton units and other units to determine best asbestos abatement strategies for the long term.
- .2 Provide costs appropriate to the asbestos abatement strategies developed.
- .3 Provide advice on industry-related best practices and procedures for both short and long term management of asbestos-containing materials.

2.0 PHASE 1 REPORT

The Phase 1 report was completed and submitted on 24 July, 2006. The Phase 2 Report which is intended to address Items 1,2 and 3 above was prepared in large part from the findings and results of the Phase 1 Report. Below is the summary of the Phase 1 Report:

Section 5: Summary of Findings (Page 19)

PLEL's review of information from CBIHA lead us to the following conclusions:

- 1. The methods, procedures and materials used for the sealing of attics, furnace exhaust piping and light fixtures meets or exceeds federal and provincial standard for this type of work.*
- 2. The methods used for both the collection and analysis of suspected bulk vermiculite insulation are the appropriate methods required for analysis of this material.*

3. *The methods used for the collection and analysis of the air samples taken to monitor work related activities during sealing operations exceeded the regulated methods normally required for this type of monitoring.*
4. *The methods used for the collection and analysis of the air samples taken inside of residential units to establish background levels or to determine if an asbestos presences existed were appropriate methods of this type of monitoring.*

PLEL's own on-site review lead us to the following additional conclusions:

5. *In some of the units inspected, residual vermiculite (minor in nature) debris was observed on floors and mechanical equipment (especially in furnace rooms). At the time of our review this observation was verbally communicated to CBIHA and steps were immediately taken to conduct a further inspection and cleanup of all units.*
6. *Redundant/unused sections of round ducts insulated with fibreglass insulation were observed in the furnace room in most units inspected. Visible chunks and pieces of vermiculite insulation were observed on the fibreglass. CBIHA could consider removal and disposal of unused equipment.*
7. *Plug and switch plates that are associated with drywall enclosures around the heating supply system had visible vermiculite insulation inside of them in varying amounts. Phase 2 of this review and audit will address this item. Until that time no work involving the removal of these plates should be undertaken without proper precautions.*
8. *Vermiculite insulation (small pieces and chunks) was observed inside some of the ductwork. A surface dust sample taken where this condition was observed did not detect either Actinolite or Tremolite asbestos associated with the vermiculite insulation present in the housing units.*
9. *Based on 3 tests of dust collected from visibly dusty surfaces of 3 units PLEL found no evidence of amphibole asbestos that may have originated in the vermiculite insulation.*

3.0 PHASE 2 REPORT

3.1 Evaluation Criteria

In evaluating the potential hazard of any installation of Asbestos-Containing Materials (ACM) the possibility or potential for fibre release is estimated by evaluating the material's condition, condition accessibility and/or location. The general method of evaluation discussed here was originally published in the U.S. EPA Purple Book

"Guidance for Controlling Asbestos-Containing Materials in Buildings", (June 1985). This simplified method has been improved in the field by some consultants but the general rating scheme remains valid.

It is important to note that this evaluation criteria where condition and accessibility are the main two criteria was developed for friable asbestos-containing materials with significantly higher amounts of asbestos within them than would be found in asbestos-containing vermiculite insulation. At the time of our review attic hatches had been reinforced, furnace room chimney enclosures sealed, fixtures on walls and ceilings sealed, and visible vermiculite debris on various surfaces such as floors and ductwork cleaned. The insulation material at that point was effectively enclosed and concealed, the major emphasis after the remediation work was completed was then on accessibility.

3.1.1 Condition

The factors evaluating the condition of the (ACM) are visually evaluated and include the following factors that describe the condition:

- a) Evidence of deterioration or delamination from the underlying surface (substrate)
- b) Evidence of physical damage (e.g. debris)
- c) Evidence of water damage

These factors are usually evaluated with a simple rating such as "Good", "Fair", or "Poor". In the initial EPA Rating these were referred to as "Good", "Minor damage or deterioration", and "Poor". Vermiculite insulation is a poured in place type of product which in the case of the CBIHA units it was poured over top of previously applied fibreglass batt insulation laid over top of a vapour barrier.

3.1.1.1 Whitney Pier and Ashby Terraces Family Units

In the representative number of Whitney Pier and Ashby Terraces units inspected:

Condition (a) would in our opinion be applicable due to the fact that the vermiculite insulation has migrated from its initial and intended area of application to other enclosed surfaces and cavities. In addition the unbound nature of this loose poured vermiculite insulation is similar to a deteriorated bound material.

Condition (b) was not a typical observation mainly because cleanup of various surfaces had already taken place.

Condition (c) was not observed in any of the representative units inspected.

3.1.1.2 Whitney Pier and Ashby Terraces 10 Unit Apartment Buildings

Each of the apartment units is a self-contained unit that is separated from other units by concrete brick wall partitions. For each of the upper floor units the concrete brick wall extends through the ceiling to the underside of the roof structure providing a full separation of each of the units. Each of the top floor apartments is therefore a self-contained unit and attic space does not appear to be shared between adjacent units.

One hatch was removed in one of the 10 Unit Apartments in Ashby Terrace and the attic was inspected for the purposes of verifying the presence of the vermiculite insulation. During the inspection of the attic space no areas of potential migration of the vermiculite insulation to other parts of the building was observed. A small exhaust ventilation duct was observed extending through the ceiling from a closet located adjacent to the apartment entrance door. An exhaust duct was observed extending from the kitchen into the attic space and exhausted to the exterior, the duct was insulated with fibreglass. It was reported by CBIHA that the small closet adjacent to the entrance door in each of the upper floor units had contained some vermiculite insulation debris. The most likely source of vermiculite into the closet would be from the attic space and likely around the duct, which extends through the closet ceiling above. The access door to the closet in 2 of the units inspected were sealed in place and not accessible for inspection purposes. Attic hatches for the top floor apartments were sealed as well.

Based on the PLEL inspection carried out in representative apartment units Condition (a) would in our opinion be applicable.

3.1.2 Accessibility

The second set of factors reflect the potential for fibre release due to direct disturbance or contact. These factors are generally referred to as the Potential for Future Disturbance, Damage or Erosion of ACM, or more simply Accessibility. The most important factors to consider are:

- d) Visibility and use of the room or area by the general occupants or maintenance staff.
- e) Accessibility of the material (i.e.: accessible from the floor or requires the use of a ladder to reach the material).
- f) Other factors (vibration of surface, unusually strong air stream, use of area)

The accessibility of the ACM is usually rated "high" or "low" in the EPA Document or by more descriptive factors. PLEL use four rating factors:

- A - Accessible to all users of a building with no ladder.
- B - Accessible in maintenance or locked service areas with no ladder.
- C - Accessible with a ladder or scaffold.

D - Enclosed or not accessible to contact without some demolition.

At the time of our review all areas of access or of potential fallout of the vermiculite insulation within the attics and other spaces was sealed. Accessibility therefore at the time of our review was rated as Accessibility D, again due to the fact that the insulation is concealed and enclosed.

3.1.2.1 Plug and Switch Plates (Whitney Pier and Ashby Terraces Family Units)

The Phase I Report indicated that the plug and switch plates associated with the drywall enclosures around the heating supply system had visible vermiculite insulation inside them in varying amounts. An accessibility rating of D would be applicable to these items due to the presence of the covers, however, considering that the light fixture covers have been sealed in place and the plug and switch plates or covers (at the time of our inspection) were not, then, for consistency purposes plug and switch plates should be sealed as well. Whether sealed or unsealed any future work involving the disturbance of these plug or switch plates by any party whether CBIHA, tenants or contractors would require that the AMP procedures be followed.

3.2 Hazard Evaluation In The Event Of Renovations, Maintenance or Demolition

The most important factor in the evaluation of friable asbestos-containing material and the potential for exposure is the maintenance, renovation, alteration or demolition planned for the area. It must be realized that this is significantly more important than any of the factors of Condition and Accessibility as they measure only the potential for fibre release. Disturbance by maintenance or renovation can cause an active or real fibre release. The final report of the Ontario Royal Commission on Matters of Health and Safety (Page 548) concluded:

"In dramatic contrast, (to asbestos workers who installed friable materials) the exposure of building occupants to asbestos fibres during normal building use will be shown to be insignificant, whether as compared to the exposure of insulation workers in the past or as compared to the much lower exposures permitted by the recently adopted Ontario workplace control limits of 1.0, 0.5, and 0.2 f/cc for chrysotile, amosite, and crocidolite asbestos respectively. Studies of asbestos concentrations in building air have shown that many buildings containing asbestos insulation do not exhibit fibre levels exceeding those in the outdoor air or in buildings not insulated with asbestos. Even when a building exhibits elevated asbestos fibre levels, these are still very low compared to current workplace control limits and are orders of magnitude below the level to which workers were exposed in the past. A typical building containing asbestos insulation will expose occupants to less than 0.001 f/cc of asbestos, or 1/1,000 of the current chrysotile control limit. Only a

small fraction of occupant exposures in all buildings containing asbestos insulation would be as great as 0.01 f/cc of asbestos.

We will conclude that it is rarely necessary to take corrective action in buildings containing asbestos insulation in order to protect the general occupants of those buildings. On the other hand, construction, demolition, renovation, maintenance, and custodial workers in asbestos-containing buildings may be exposed to significant asbestos fibre levels and may, during their work, cause elevated fibre levels for nearby occupants. We will devote Chapter 10 to the problem of protecting these workers and of protecting occupants from possible fibre release as a result of building work. This, and not the protection of building occupants in the absence of such work, is the real challenge that asbestos insulation in buildings presents."

Note: Tremolite or actinolite asbestos found in vermiculite insulation are within the same amphibole group as amosite and chrocidolite asbestos referenced above.

Therefore the evaluation of the action that will disturb asbestos becomes the most important factor to consider. This is reflected in the procedures prescribed by the regulators in asbestos related regulations, codes of practices or guidelines.

3.3 Corrective Measures and Options

If friable asbestos material is identified, some action to prevent exposure to asbestos is required. This may be a very inexpensive or a very expensive control measure. In deciding which course of corrective action provides the most efficient long-term solution, consideration should be given to the present condition of the materials containing asbestos, the location of this material, the potential for the material to be disturbed, the cost of the proposed method of controlling asbestos exposure and the future use of the building or equipment. Compliance with applicable regulations is also essential in selecting a control option.

There are four basic approaches to controlling, managing or eliminating asbestos exposure.

3.3.1 Removal

For removal, the asbestos material is collected and placed in containers for burial in an approved waste disposal site. 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 in all Canadian provinces (including friable and non-friable materials).

Insulation material that has been removed (other than pre-demolition) would typically be replaced to maintain compliance with fire and building codes or to replace thermal insulation. If the asbestos material fulfilled either an insulating or acoustical function, a replacement material should have similar characteristics.

3.3.2 Encapsulation

For encapsulation, the asbestos material is coated or treated 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. Bridging sealants are applied over the surface of the material using airless spray equipment at a low pressure setting. Airless equipment reduces the pressure of the sealant spray and the impact upon the friable asbestos material surface, thus reducing fibre release during application.

Encapsulation should be limited to areas where the asbestos containing material will not be subject to further damage by contact. This factor may preclude the use of encapsulation as a corrective measure in many areas since activity in the buildings may result in contact with treated surfaces and subsequent damage. Encapsulated material 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 in the event of demolition or major renovations. For all of these reasons encapsulation is rarely chosen as a control measure for other than local areas where removal is not possible.

3.3.3 Enclosure

For enclosure, a barrier such as a suspended ceiling is constructed between the asbestos material and the building environment. When the enclosure is damaged or entered for maintenance, airborne asbestos may be released into the building environment. Although the method may be less costly than removal in the short term, the long term cost will be similar because ultimately removal will be necessary in the event of demolition or major renovations.

3.3.4 Surveillance with a Management Program

If the material is left in place in good condition, encapsulated, or enclosed, a continuing inspection program should be implemented. The asbestos material should be routinely checked for deterioration or damage unless it is fully enclosed and inaccessible for observation. If the condition or accessibility of the material changes so that fibres are being released and contaminating the building environment, corrective action should be considered.

The maintenance staff must also be aware of the correct procedures to be used to reduce any potential hazard. The cost of establishing an asbestos management

program is not great and may allow a cost savings if work can be deferred to a later renovation or demolition. 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.

As long as asbestos remains in a building, a management system should be implemented to ensure that asbestos is not released into the building environment due to maintenance, renovation, or repair work performed by either maintenance workers, outside contractors or building occupants.

3.4 Costs for Asbestos Abatement Strategies (All Options)

The prices for all options below are our best estimate at this time and have been prepared with the assistance of a reputable contractor.

3.4.1 Removal

3.4.1.1 Whitney Pier and Ashby Terraces (80 Family Units)

Visual inspections of representative units has confirmed that the vermiculite insulation has migrated from attic spaces into various cavities such as ceilings, wall spaces and heating system duct enclosures. This condition was visually confirmed on each of the levels of the units and confined to interior wall and ceiling spaces. To remove all vermiculite insulation would require access to all these spaces, this would require removal of the majority of drywall ceilings, stairwell enclosures and drywall that encloses the building(s) heating systems. Two options could be available for removal as follows:

Option 1:

Removal of all attic space insulation including removal of all accessible vermiculite insulation in wall spaces and other cavities accessible by vacuum with extensions from the attic space. This would not be considered a full removal as some of the wall and ceiling cavities could not be accessed from the attic.

The estimated cost for this work is \$5,500.00 per unit. The per unit cost could be reduced if removal was done in groups of units. We would estimate that the per unit cost could be reduced to \$4,500.00 per unit for work involving at a minimum 5 or more units at a time. HST would be additional.

This option could be performed without removal of any of the furnishings from the units, however we recommend that tenants be temporarily relocated while the work is performed. We estimate that tenants would need to be relocated for a period of 3-4 days. For each unit the attic space would need to be isolated from the remainder of the building, worker decontamination units would need to be provided, the attic space would

need to be put under negative pressure, and all material would need to be removed and disposed of at an approved landfill site.

No allowance has been provided for reinstallation of new building or insulating materials required as a result of the work or for tenant relocation costs.

Whitney Pier Units:

Done individually:	40 @ \$5500.00/Unit = \$220,000.00
Done in groups of 5 or more:	40 @ \$4500.00/Unit = \$180,000.00

Ashby Terraces Units:

Done individually:	40 @ \$5500.00/Unit = \$220,000.00
Done in groups of 5 or more:	40 @ \$4500.00/Unit = \$180,000.00

Option 2:

Removal of all vermiculite insulation from attic spaces and all other affected cavities such as ceilings, wall spaces, stair enclosures and heating system duct enclosures. This would require the removal of the majority of drywall on interior walls and ceilings.

The estimated cost for this work is \$8,700.00.per unit. The per unit cost could be reduced if removal was done in groups of units. We would estimate that the per unit cost could be reduced to \$8,100.00 per unit for work involving at a minimum 5 or more units at a time. HST would be additional.

This option would have to be conducted with the units fully vacated and empty. We estimate that this work could take up to 5-6 days to complete, this does not include refinishing or reinstallation of removed construction materials. When work is performed each unit would be isolated, worker decontamination units would need to be provided, the unit would need to be put under negative pressure, and all material would need to be removed and disposed of at an approved landfill site. No allowance has been provided for reinstallation of new building or insulating materials required as a result of the work or for tenant relocation costs.

Whitney Pier Units:

Done individually:	40 @ \$8700.00/Unit =	\$348,000.00
Done in groups of 5 or more:	40 @ \$8100.00/Unit =	\$324,000.00

Ashby Terraces Units:

Done individually:	40 @ \$8700.00/Unit =	\$348,000.00
Done in groups of 5 or more:	40 @ \$8100.00/Unit =	\$324,000.00

3.4.1.2 Ten Unit Apartment Buildings (Whitney Pier and Ashby Terraces)

For both Whitney Pier and Ashby Terraces each of the 4 top floor apartments is a self-contained unit and attic space is not shared between adjacent units. Masonry brick walls extend up to the underside of the roof between the units. It was reported by CBIHA that the small closet adjacent to the entrance door to each unit in each of the upper floor units did contain some vermiculite insulation debris. The access doors to these closets were sealed in place and not accessible for inspection purposes. The 2 Apartment buildings are heated with hot water heating unlike the family housing units which are heated by hot air ducting systems. Other than the vermiculite insulation reported in the small closets no visible vermiculite insulation debris was observed in the two 10 unit apartment buildings. Based on these observations there is one removal option.

Option 1:

Removal of all attic space insulation. Tenants would likely need to be temporarily relocated while the work is performed. For each unit the attic space would need to be isolated from the remainder of the apartment, worker decontamination units would need to be provided, the attic space would need to be put under negative pressure, and all material would need to be removal and disposed of at an approved landfill site.

The estimated cost for this work is \$5,500.00 per unit. HST would be additional.

No allowance has been provided for reinstallation of new building or insulating materials required as a result of the work or for tenant relocation costs.

Whitney Pier Apartments:

Done individually:	4 @ \$5500.00/Unit =	\$22,000.00
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Ashby Terraces Units:

Done individually:	4 @ \$5500.00/Unit =	\$22,000.00
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3.4.2 Encapsulation

Encapsulation is not recommended as an option for either the short term or long term management of the vermiculite insulation in any of the units including the apartment units. PLEL is not aware of this practice ever having been considered for this type of product. Due to the granular and absorptive nature of vermiculite insulation we do not believe that encapsulation should be considered at all. The insulation would remain in the units; it would still have to be managed in the long term the same way as it would if it were enclosed. To encapsulate the insulation the same procedures for attic isolation and worker protection would need to be performed. Compared to removal costs would certainly be less in the short term however in the long term there would still be costs associated with managing the material on a regular basis and removal at some point in the future. Encapsulation could affect the value of the insulation in terms of its insulating properties, there would be no guarantee that due to the vermiculite insulation migration problems that you could encapsulate all the material. PLEL does not consider this a practical solution for either the short or long term.

3.4.3 Enclosure

Enclosure would involve the construction of a barrier such as a suspended ceiling or wall constructed between the asbestos material and the building environment. Considering that the type of construction is residential and the insulation was placed in the attic spaces after initial construction, it is already enclosed. Work recently done to seal attic hatches, seal furnace exhaust spaces, light fixtures etc. further assures that the enclosure system is adequate to enclose all the insulation.

PLEL is not aware of the costs that were incurred by CBIHA to fully enclose and seal in the vermiculite insulation, therefore no costs are provided for this as an option since it is already completed and no further work is required to complete this work.

3.4.4 Surveillance with a Management Program

One of the possible routes for controlling asbestos exposure requires the establishment of a Management and Surveillance Program. This would be referred to as an Asbestos Management Program (AMP).

The Nova Scotia Code of Practice "Managing Asbestos in Buildings" concisely outlines what such a management program should consist of. It is similar to good practice guidelines in other provinces and guidelines from Public Works Canada in various regions. The prime function of the management program is to educate all staff performing job functions that might in any way disturb the existing asbestos installation. Obvious sources of deterioration or contact causing contamination should be eliminated. The possibility of opening up new avenues of contamination or spreading existing fibre accumulations should also be anticipated and controlled. The management system

should provide for periodic inspections; the frequency of these depends on regulatory requirements and the perceived degree of risk but is generally conducted at least annually.

The following is a clear description of an AMP which would comply with not only the Nova Scotia Code of Practice but all provincial and federal regulations or guidelines. In order to ensure the AMP is functioning it is necessary that responsibilities be defined and allocated. A building owner or someone acting on behalf of the owner should be responsible for the following points:

- a) Arrange for the preparation of the initial Asbestos Inventory Report. Ensure the Occupational Health and Safety Committee are invited to observe the survey and are provided with the results.
- b) Provide any occupants of the building (tenants) written notice of the location of all friable and non-friable ACM.
- c) Develop and implement appropriate work procedures where work may disturb insulation. Provide or arrange for awareness and procedures training for maintenance staff and supervisors who will actively disturb asbestos in their work, or may respond to spills, or damage.

Note: (a), (b) and (c) have been completed by CBIHA for the vermiculite insulation.

- d) Notify contractors who may disturb asbestos materials.
- e) Ensure maintenance workers or contractors are aware of the locations of friable and non-friable materials.
- f) Maintain supplies and equipment required for asbestos work undertaken by building staff (would not be required if all work is contracted out).
- g) Arrange for disposal of asbestos waste as required.
- h) Respond to report of asbestos debris, or deteriorated or damaged enclosures.
- i) Evaluate deteriorated enclosures and provide clean up and repair/enclosure/removal as appropriate.
- j) Arrange for any major removal or abatement projects. Provide tenderers with written notice of locations of friable materials.

- k) Arrange for re-assessment of the vermiculite insulation enclosures at least annually.
- l) Update asbestos survey to reflect removal or repair work at least annually.
- m) Arrange for training of new staff as required and refresher training of existing staff (respirator testing must be at least annually).
- n) Maintain Records of Asbestos Work Reports, copies of waste manifests, Notice of Project Forms, re-assessments, etc.

The costs associated with establishing an AMP would involve 2 parts:

- .1 Program Start-up Costs
- .2 Program Maintenance (long term)

Program start-up costs can be significant as they would involve implementation of most of the above points at the start-up. In our review of the work and procedures implemented to date, it is apparent that CBIHA has the policies, procedures, and practices in place for an AMP. PLEL is not aware of the actual costs incurred by CBIHA for developing an AMP to this point. It is reasonable to assume that taking into consideration the size of the organization, the number of buildings under its direct control and management, and the relatively short time that CBIHA has had to initiate this type of program that costs have been substantial.

The on-going maintenance of an AMP will have cost implications for CBIHA as well. These would be costs associated with many of the items listed above, specifically items d, e, f, g, h, i, j, k, l, m and n. PLEL would expect that the ongoing maintenance of the AMP would as well be substantial and could be in the range of \$500.00 to \$1000.00 per unit annually for each of the Whitney Pier and Ashby Terraces. This would be an overall annual budget item of between \$22,000.00 to \$44,000.00 for each of the Whitney Pier and Ashby Terraces including the Apartment Buildings or \$44,000.00 to \$88,000.00 in total. We would consider this an internal cost to CBIHA. It would not include any additional costs applied by outside service contractors retained by CBIHA to conduct their work that may now involve asbestos related precautions being taken. These contractor costs would only be incurred if their work disturbed any of the walls, ceilings and fixtures that enclose the vermiculite insulation or any other ACM's that may be present in the buildings.

4.0 SHORT TERM AND LONG TERM MANAGEMENT OF ASBESTOS-CONTAINING MATERIALS

Section 3.0 has outlined the options available to DCS and CBIHA to deal with the asbestos containing vermiculite insulation present within the Whitney Pier and Ashby Terraces. These are options that are recognized both as industry standards and regulatory standards, however are standards that would apply to asbestos-containing materials in general and not specifically to any particular type of product or material. This section will discuss the advantages and disadvantages of each of the control options presented in Section 3.0. It is intended to assist CBIHA with any decisions it will need to make with respect to the short or long term management of the vermiculite as well as any other ACM that may be present within the Whitney Pier and Ashby Terraces as well as any asbestos-containing materials within any other of its buildings under its control and management.

4.1 Removal

4.1.1 Advantages of Removal

The advantages of removal are:

- .1 It eliminates the asbestos source
- .2 It ends the need for an on-going surveillance program (AMP)

4.1.2 Disadvantages of Removal

The disadvantages of removal are:

- .1 It is usually the most costly, complicated and time consuming method
- .2 It would require the replacement of the material removed
- .3 It has the highest potential for worker exposure during removal
- .4 May involve tenant relocation

4.1.3 General Comments on Removal

- .1 PLEL is not aware of any requirement either federally or provincially to remove asbestos-containing vermiculite insulation or any other type of ACM just for the sake of removal. The presence of asbestos containing materials in buildings can have the effect of devaluing a property. PLEL is aware that in the residential re-sale of properties that have this type of insulation it has been required by prospective purchasers that this insulation be removed and replaced with another insulating material.
- .2 Removal would be mandatory prior to any major renovation, alteration or demolition
- .3 Removal costs would be significantly reduced if combined with a major renovation, demolition or tenant move.

4.2 Encapsulation

4.2.1 Advantages of Encapsulation

- .1 Typically more rapid and economical control method
- .2 Helps reduce the potential for fibre release

4.2.2 Disadvantages of Encapsulation

- .1 The ACM remains in the building
- .2 The ACM will be difficult to remove in the future and as a result more costly
- .3 Will require that the ACM be continually managed in the long term
- .4 Precautions would be required to prevent any damage during any building maintenance or renovation projects

4.2.3 General Comments on Encapsulation

- .1 Encapsulation is only used for spray-applied asbestos containing materials.
- .2 It is a temporary measure only, removal will be required eventually
- .3 Removal would be considered high risk work under the provincial standards
- .4 Could be difficult to perform due to difficulty in accessing all the ACM
- .5 PLEL is not aware of this option having ever been used as a viable option for asbestos-containing vermiculite insulation

4.3 Enclosure

4.3.1 Advantages of Enclosure

- .1 Controls potential exposure to the ACM
- .2 Can be a rapid, economical, and uncomplicated method

4.3.2 Disadvantages of Enclosure

- .1 The ACM remains in the building
- .2 Will require that the ACM be continually managed in the long term
- .3 Would require that asbestos related precautions be followed for entry into enclosures

4.3.3 General Comments on Enclosure

- .1 Removal maybe required in the event of demolition or major renovations.
- .2 No need for CBIHA to construct enclosures around the vermiculite as enclosures such as walls and ceilings are already in place.

4.4 Surveillance with an Asbestos Management Program (AMP)

4.4.1 Advantages the AMP

- .1 Initial cost is lower compared to the other options
- .2 There is minimal disruption to day-to-day operation of the buildings

4.4.2 Disadvantages of the AMP

- .1 ACM remains in the building.
- .2 Management is required for as long as the material remains
- .3 Precautions would be required to prevent any damage during maintenance or renovations

4.4.3 General Comments on Surveillance and the AMP

- .1 May be difficult and costly to implement and enforce
- .2 Potential problems with tenants, contractors or purchasers
- .3 Outside of the residential resale market this is the preferred option by building owners with this type of material; mainly, as in the CBIHA case, the insulation is already enclosed

5.0 SAMPLING PROGRAMS

The Phase 1 Report issued in July of 2006 described various testing programs conducted by CBIHA, its representatives as well as PLEL. The testing programs described in the Phase 1 Report included:

- Section 4.4.1 Air Sampling
- Section 4.4.2 Bulk Sampling
- Section 4.4.3 Surface Sampling

Based on the results of these testing programs PLEL did not consider it necessary to conduct any additional testing programs for the preparation of the Phase 2 Report.

On a go forward basis air monitoring programs would be recommended for any work, such as major renovations, alterations or removal of the vermiculite insulation. Major renovations and alterations could have the potential to disturb the asbestos-containing insulation; removal would disturb the asbestos-containing insulation. Air monitoring programs could be conducted to confirm that workers are properly protected and that areas adjacent to the disturbance of the asbestos-containing insulating materials are not negatively impacted by the work. At a minimum final air clearance testing should be conducted prior to re-occupying the work areas. If any of this work is done while buildings are occupied it would be recommended that air monitoring be conducted to ensure the protection of building occupants.

If any building surfaces, equipment, or furnishings have the potential to be affected by alterations, renovations or removal then adequate protection should be provided for these items to ensure that they are not contaminated as a result of the work.

6.0 CONCLUSIONS

PLEL has presented a number of options available to the Nova Scotia Department of Community Services for the management of the asbestos-containing vermiculite insulation within the Whitney Pier and Ashby Terraces buildings located in Sydney Nova Scotia. The options presented are both long term and short term options. These options are recognized control options both federally and provincially and are recognized within the industry in general. Removal, enclosure or the implementation of an AMP could be considered for the housing units. In our opinion we do not feel that the encapsulation option is a viable one for the CBIHA units. The option of enclosure is already in place due mainly to the type of construction which is residential and wall and ceiling finishes that would define an enclosure are already in place. This leaves two other options, removal or surveillance with a management program.

During the spring and early summer of 2006 a number of tests in representative units were conducted by CBIHA and its advisors as well as PLEL. The Phase 1 Report has described these tests and the results. The tests concluded that the vermiculite insulation in its present condition undisturbed is not causing fibre release to the general building environments. These results are in our experience consistent with the presence of this type of insulation in other buildings of a similar nature and in fact even when the asbestos content of other materials is much higher. The same results have been obtained in buildings even when the asbestos content of the ACM in these buildings is greater than 90% by volume which is obviously much higher than the content of asbestos within vermiculite insulation. There were no conditions observed or results of tests conducted by PLEL or others during our review process that would make us recommend removal at this time for any of the Whitney Pier or Ashby Terraces housing units or the apartment buildings.

PLEL considers surveillance with a management program to be the more practical option for the Whitney Pier and Ashby Terraces. In establishing this option PLEL based this on the safety and technical feasibility related to worker and occupant safety, not the cost. In addition, a number of the elements associated with establishing a surveillance and management program have already been implemented by CBIHA. Should the Department choose this option it will need to consider the long term implications that this program will have on CBIHA, its staff, tenants as well as contractors retained by CBIHA to conduct various services within the buildings.



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