

PART II

**BUILDING, SPECIAL OPERATIONS AND MAINTENANCE PLAN
FOR ASBESTOS-CONTAINING MATERIAL (ACM)**

- . **APPLICABILITY**
- . **WORKER PROTECTION**
- . **CLEANING**
- . **O & M ACTIVITIES**
- . **MAINTENANCE ACTIVITIES (other than
small-scale)**
- . **FIBER RELEASE EPISODES**
- . **TRAINING**
- . **PERIODIC SURVEILLANCE**

**PENN MANOR SCHOOL DISTRICT
ADMINISTRATION OFFICE
MILLERSVILLE, PENNSYLVANIA 17551**

ASBESTOS CONTROL MANAGER / DIRECTOR OF ENVIRONMENTAL SERVICES

MARCH 30, 1988

**PENN MANOR SCHOOL DISTRICT BUILDINGS
WITH FRIABLE AND NONFRIABLE ACBM**

	FRIABLE ACBM	NONFRIABLE ACBM
1. Penn Manor High School East Cottage Avenue Millersville, PA 17551	Yes	Yes
2. Marticville Middle School R.D. 1 Pequea, PA 17565	No	Yes
3. Penn Manor 9th Grade Building East Cottage Avenue Millersville, PA 17551	Yes	Yes
4. A. Letort Elementary School Route 1 Washington Boro, PA 17582	Yes	Yes
5. Central Manor Elementary School Route 1, Box 476 Washington Boro, PA 17582	Yes	Yes
6. Conestoga Elementary School R.D. 1 Conestoga, PA 17516	Yes	Yes
7. Fred Eshelman Elementary School Leaman Avenue Millersville, PA 17551	Yes	Yes
8. Hambright Elementary School 25 Millersville Road Lancaster, PA 17603	Yes	Yes
9. Martic Elementary School R.D. 2 Holtwood, PA 17532	Yes	Yes
10. Pequea Elementary School Box 128A R.D. 3, Millwood Road Willow Street, PA 17584	Yes	Yes

O & M PROGRAM OBJECTIVES

The overall goal of an asbestos O & M program is to maintain the building environment free of asbestos contamination. The specific program objectives are to: (1) remove asbestos fibers that may have been released from the ACM; and (2) minimize future release and distribution of fibers by controlling activities that might disturb the ACM.

The O & M program focuses on the activities of custodial and maintenance workers and service contractors. Special procedures for routine cleaning by custodial workers are designed to achieve the first program objective -- collecting previously released fibers. In order to achieve the second program objective -- minimizing ACM disturbance -- special work practices are designed for maintenance workers. Work practices are tailored to four types of projects: (1) those which are unlikely to involve any contact with ACM, (2) those which may cause accidental disturbance of ACM, (3) those which involve small scale manipulation or removal of ACM, and (4) those which involve large scale manipulation or removal of ACM. Response actions for fiber release episodes are also specified in the O & M program.

Success in achieving and maintaining a building with ACM free of asbestos contamination depends on the characteristics and location of the ACM as well as on the design and enforcement of the O & M program. O & M procedures will not be sufficient for ACM that is severely damaged or in certain building locations. The EPA document "Guidance for Assessing and Managing Exposure to Asbestos in Buildings" provides guidance for determining when the ACM should be removed, or when other control measures are needed to enhance an O & M program.

**BUILDING, SPECIAL OPERATIONS AND MAINTENANCE PLAN
FOR ASBESTOS-CONTAINING MATERIAL (ACM)
Per 40 CFR Part 763.91 OPERATIONS AND MAINTENANCE**

INTRODUCTION

The process of identifying asbestos-containing materials (ACM) within a facility is the first step in controlling building occupant exposure to asbestos fibers. Information generated during the building survey can be assembled into a useable format that allows an asbestos program manager to control disruption of ACM. This process of interim control of exposure to asbestos in buildings is the Operations and Maintenance Plan.

The Operations and Maintenance (O & M) Plan outlines the Policies and Procedures to be followed in the Penn Manor School District relative to the successful management of Building Asbestos-Containing Material (ACBM). The primary three objectives of the O & M Plan are:

1. Clean existing contamination and minimize future fiber release by controlling access to ACM.
2. Develop a written plan that serves as a legal document. This plan documents Penn Manor School District's "reasonable care" in dealing with asbestos in the school buildings.
3. Defer more permanent abatement action and associated costs.

This plan applies to asbestos materials as identified in the Penn Manor School District Asbestos Assessment and Inventory Study completed on January 11th, 1988 and will apply to all feasible, potential friable and/or non-friable asbestos-containing material found in the District subsequent to this study.

SCOPE

This plan provides for:

1. An hierarchical framework for the reporting of damage to any ACM and a mechanism to assure repair, isolation or abatement of damaged ACM. This framework has assigned program responsibilities to individuals in order to assure accountability.
2. Building occupant notification and warning
3. Cleaning procedures to be used in areas containing:
 - . Thermal Systems Insulating ACM
 - . Miscellaneous ACM and Surfacing ACM

4. Procedures to assure that ACM is not disturbed and procedures to be followed for renovation activities.
5. Locations of Asbestos-Containing Material
6. Periodic Inspections
7. Training for Building Occupants
8. Respiratory Protection Program
9. Medical Surveillance Program
10. Maintenance Renovation Permit System
11. Emergency Response Procedure
12. Recordkeeping
13. Cost Estimation

POLICY STATEMENT

It is the policy of the Penn Manor School District to maintain asbestos-containing materials in a state that presents the lowest possible risk to building occupants. The School District will closely monitor the condition of Surfacing Asbestos-Containing Material and Miscellaneous Asbestos-Containing Material. Damage to friable Surfacing Material and/or damage causing friable Miscellaneous Asbestos Material will be repaired immediately and the area decontaminated.

OPERATIONS AND MAINTENANCE PROGRAM ELEMENTS

Item 1

Reporting Framework/Description of Responsibility

Figure I presents a reporting framework to assure prompt reporting of damage to asbestos materials, asbestos dust, asbestos debris, etc. and to ensure swift remedial action. Presented below is a breakdown of the categories in the framework showing project responsibilities.

Teachers -

Teachers will report damage or other disturbance of asbestos materials to the Building Coordinators.

Custodial Staff -

the Custodial Staff will report damage or other disturbance of asbestos materials to the Building Coordinators. The Custodial Staff is responsible for the initial and periodic cleanings under this program.

Building Coordinators -

Building Coordinators are responsible for relaying damage reports to the Asbestos Control Manager. The Building Coordinator will respond to decisions made by the Asbestos Control Manager in consultation with the Industrial Hygienist.

If asbestos damage occurs in a student occupied space, the coordinator will provide space for the students/faculty in a non-asbestos damaged space until the damage is repaired and the area cleaned. As a check, after repair/cleaning operations, the Building Coordinator will inspect the area where the damage occurred and relay the results of this spot check to the Asbestos Control Manager.

The plan has been devised so that after a successful repair operation, the Maintenance Staff and Building Coordinator will both contact the Asbestos Control Manager. The repair operation should not be considered to be finished until both parties report successful repair to the Asbestos Control Manager.

The Building Coordinator must know when and where asbestos repair will occur. Therefore, the Maintenance Staff and Asbestos Control Manager must communicate this information to him/her.

The Building Coordinator is responsible for informing teachers of the location of ACM and to send circulars at periodic intervals to faculty and staff to ensure that Asbestos-Containing Materials are not disturbed.

Maintenance Staff -

the trained Maintenance Staff is responsible to report damage to ACM to the Asbestos Control Manager. The Asbestos Control Manager in consultation with the Industrial Hygienist will determine response action to each situation. The trained Maintenance Staff will perform small scale, short duration repairs or removal/replacements as required by the Asbestos Control Manager and will report successful completion of an operation to both the Asbestos Control Manager and the Building Coordinator. The trained Maintenance Staff will perform all clean-ups of asbestos dust and debris from damage to Asbestos Surfacing, Thermal Insulation or Miscellaneous ACM under this plan.

Asbestos Control Manager -

the Asbestos Control Manager plays the pivotal role in coordinating the Special Asbestos Operations and Maintenance Plan. The Asbestos Control Manager will:

- . Be trained in the health effects of asbestos, the detection, identification and assessment of ACM, options for controlling ACBM, Asbestos Management Programs and relevant Federal and State Regulations concerning asbestos.
- . Make decisions in consultation with the Industrial Hygienist as to the significance of reported damage.
- . Order small scale, short duration removal/replacement or repair to be performed by Maintenance Workers or outside Contractors.
- . Order emergency repairs or abatement projects be performed by licensed, Certified Abatement Contractors if repair/work exceeds quantities for small scale, short duration removal or repair work. This decision will be made in consultation with the Industrial Hygienist.

- . Ensure that the Building Coordinator and Maintenance Staff know the exact location and time of ACM repair/abatement.
- . Ensure the successful completion of repair operations (an operation is not complete until both the Maintenance Staff and Building Coordinator report to the Asbestos Control Manager).
- . Ensure that periodic inspections are conducted per AHERA regulations.
- . Ensure that cleaning operations occur at scheduled times (i.e. monthly cleaning in areas with friable Surfacing ACM and cleaning every six months for Thermal Systems Insulating ACM).
- . Ensure that if any construction or renovation is to occur, that it:
 - a. will not affect ACM or
 - b. if it does affect ACM, the Asbestos Control Manager will ensure that an EPA Certified and licensed Abatement Contractor is retained to:
 - . correctly remove the affected ACM
 - . ensure that the Industrial Hygienist takes air samples following repair/removal operations per the new AHERA regulations and that the results of air samples are within established regulations/guidelines before allowing re-entry into building spaces.
 - . inform the Maintenance Staff and Building Coordinators as to the results of all air monitoring following repair/removal.

Industrial Hygienist - the Industrial Hygienist will serve as the Building Inspector, Management Planner and Abatement Designer under this plan. The Industrial Hygienist will advise the Asbestos Control Manager relative to decisions regarding in-house repair versus the use of an outside contractor for abatement activity. The Industrial Hygienist will respond to requests for air monitoring and visual inspection before, during, and after asbestos removal projects. The Industrial Hygienist will respond to requests for bulk sampling for AHERA Regulations and to gather information for contract documents in the event renovation is planned. The Industrial Hygienist will perform all air sampling following AHERA release criteria. The Industrial Hygienist will oversee Asbestos Abatement Contractors work and ensure that work is performed according to the project specifications.

Abatement Contractor - the Abatement Contractor will perform Asbestos Removal Operations which are too large to be handled as a short duration activity. The Abatement Contractor is responsible to the Asbestos Control Manager and the Industrial Hygienist.

ITEM 2

Building Occupant Notification and Warning

The purpose of the notification and warning program is to inform employees, building occupants, or other with the potential to come in contact with building, Asbestos-Containing Materials, that such material is present.

The notification and warning program serves two purposes:

1. It alerts affected parties to a potential hazard in the building
2. It generates a broad involvement in the Operations and Maintenance Program. Building occupants who are aware of the presence of ACM are less likely to disturb the material and cause fiber release.

FIGURE I

**ASBESTOS CONTROL
MANAGER**

**DIRECTOR OF
MAINTENANCE
(717) 872-9500**

**DARRYL BRANDON/VOLZ ENVIRONMENTAL
SERVICES
INDUSTRIAL HYGIENISTS
BUILDING INSPECTORS
MANAGEMENT PLANNERS
(412) 828-6666**

**ASBESTOS ABATEMENT
CONTRACTOR**

BUILDING COORDINATORS

**MAINTENANCE STAFF
(Performs Repairs)**

PENN MANOR H.S./

PENN MANOR 9TH GRADE/

A. LETORT ELEMENTARY/

CENTRAL MANOR ELEMENTARY/

CONESTOGA ELEMENTARY/

ESHELMAN ELEMENTARY/

HAMBRIGHT ELEMENTARY/

MARTIC ELEMENTARY/

MARTICVILLE MIDDLE/

PEQUEA ELEMENTARY/

TEACHERS

CUSTODIAL STAFF

Each year on September 1, starting in 1988, notices shall be sent to all employees and building occupants or their legal guardians. Notification of building occupants can be achieved by distributing notices or holding informational seminars. The following information shall be included:

- . Asbestos is a potential health hazard
- . Material containing asbestos has been found in the Penn Manor High School, the Marticville Middle School, the Penn Manor 9th Grade Building, the A. Letort, Central Manor, Conestoga, Fred Eshelman, Hambright, Martic, and Pequea Elementary Schools.
- . The types of ACM in the facilities
- . The exact locations of these materials
- . How individuals can avoid disturbing ACM
- . How to recognize and report damage
- . How Custodial and Maintenance personnel are dealing with these materials to prevent fiber release
- . What will be done periodically and over the long run to protect the health and safety of building occupants

ITEM 3

Cleaning Schedule and Cleaning Procedures to be Followed in Areas Containing Surfacing ACM, Thermal Systems Insulating ACM and Miscellaneous ACM

Presented below is a Cleaning Schedule and Cleaning Procedures to be followed for Custodial Cleaning of areas containing Surfacing, Thermal Systems Insulating and Miscellaneous ACM. The trained Maintenance Staff will perform all cleaning of visible asbestos dust and debris due to damage, etc. under this plan. The Custodial Staff will perform the initial and periodic cleaning under this plan.

A. Cleaning of Areas Containing Thermal Systems Insulating ACM

1. Procedure

All floors shall be wet mopped (if accessible) all horizontal surfaces (shelves, etc.) shall be wet wiped

(if accessible). A mist spray bottle shall be employed to keep cloths damp. Cloths and mop heads shall be disposed in a 6-mil plastic bag, properly labeled. The training Maintenance Staff will handle disposal of all asbestos-containing waste. All unit ventilation filters and other heating, ventilating, and air conditioning filters in areas where ACM is present, shall be HEPA vacuumed and disposed of in 6-mil bags. Any carpets or draperies in these areas shall be HEPA vacuumed. The trained Maintenance Staff will empty the contents of the HEPA vacuum into the 6-mil bags.

Warning signs serve as the final line of defense to prevent unprotected individuals from disturbing ACM. Warnings are in the form of posted signs or notices directly attached to ACM or at entrances to areas where ACM is concentrated (e.g. boiler rooms). Warning signs used in conjunction with small renovation or repair that involves the disruption of ACM should be posted at entrances and around the perimeter of the project in accordance with the OSHA Asbestos Standard for the Construction Industry (29 CFR 1926.58).

2. Initial Cleaning

The initial cleaning under this plan shall be performed by June 1, 1988 (EPA purple book). All areas of the Penn Manor School District Buildings where friable ACM, damaged or significantly damaged thermal system insulation ACM are present shall be cleaned at least once after the completion of the inspection required by Part 763.85(a) and before the initiation of any response action, other than O & M activities or repair, according to the above procedures.

3. Periodic Cleaning

The periodic cleaning under this plan shall be performed semi-annually in all areas containing Thermal Systems Insulating ACM. The first periodic cleaning shall be complete by December 1, 1988 and each subsequent cleaning shall be completed within six (6) months.

Table I included in this report, outlines the location of all ACM in the Penn Manor School District Buildings. There is a column for each Location/Type of ACM where the date of the Initial Cleaning can be inserted. The frequency of periodic cleaning follows as a footnote for each friable ACM location.

All areas of the school buildings where friable ACBM, Damaged or Significantly Damaged Thermal Systems Insulation ACM, or friable Suspected ACBM assumed to be ACM are present shall be cleaned at least once after the completion of the inspection required by AHERA and before the initiation of any response action, other than O & M activities or repair.

- B. All Surfacing Asbestos-Containing Materials and Floor Tiles in the Penn Manor School District Buildings have been sampled. All plaster samples have tested negative for asbestos. The majority of the floor tiles have an asbestos content of greater than 1%. No special precautions are necessary for the routine cleaning of the floor tiles. The requirements of the O & M Plan shall be followed if there is to be any grinding or chipping of the floor tiles.

ITEM 4

Procedures To Assure That ACM is Not Disturbed

A. In-House Disturbance

The Asbestos Control Manager is responsible to provide a copy of this plan to all program participants including Building Coordinators, Trained Maintenance Staff Members and the Custodial Staff. The Building Coordinators are to provide the locations of Asbestos-Containing Materials to Teachers in their building accompanied by directions not to disturb the material in any way. Areas of particular concern include:

- . Areas where Thermal Systems Insulation ACM penetrate student occupied areas or hallways

The Building Coordinators are responsible to inform teachers of the location of the ACM's and to send notices to all staff regularly (every 6 months) reminding them to ensure that no activities occur which could disturb these materials. The contents in these notices shall include prohibitions about hanging objects from asbestos pipe insulation or otherwise disturbing Asbestos-Containing Material.

- . All teachers shall be alerted to immediately report damage to the Building Coordinator. All special cleaning, improvement, building repair or special maintenance actions must be cleared by the Asbestos Control Manager to assure that these operations do not disturb asbestos materials.

B. Disturbance By Outside Contractors

The Asbestos Control Manager will inform all Contractors, in writing, of the location of the ACM if they must work in areas containing ACM. The Maintenance Permit System (see Figure 2) will allow the Asbestos Control Manager to track and document all outside contractor's work within the Penn Manor School District Buildings. It is the responsibility of the Asbestos Control Manager to ensure that if building repairs or renovation affecting ACM are required, a Qualified Abatement Contractor will be required to remove the asbestos before disturbance. The Asbestos Control Manager will be assisted in his function by the Industrial Hygienist.

SURFACING MATERIALS

Contact with ACM Unlikely

In most buildings with ACM, many routine maintenance activities can be conducted without contacting the ACM. For example, changing light bulbs in a fixture on a ceiling with asbestos-containing acoustical plaster can usually be performed without jarring the fixture or otherwise disturbing the ACM (the top of the fixture should have been wet-cleaned previously to remove settled fibers). In these situations, few precautions other than normal care are needed. The only precaution is to assure the availability of respirators and a HEPA vacuum if needed. These do not have to be taken to the site, but should be available at a known location in the building. Where maintenance is performed in parts of the building free of ACM, no special precautions are usually necessary. An exception would be work causing vibrations at a distant location where ACM may be present.

Accidental Disturbance of ACM Possible

Routine maintenance and repair includes work on light fixtures, plumbing fixtures and pipes, air registers, HVAC ducts, and other accessible parts of building utility systems. Where these fixtures or system parts are near friable ACM, maintenance work may unintentionally disturb the ACM and release asbestos fibers.

For example, maintenance work on ventilation ducts in an air-handling rooms where asbestos fireproofing is present only on structural beams could be conducted without contacting the ACM. However, the fireproofing could be disturbed accidentally during the course of the work.

The following precautions and procedures should be used if accidental disturbance of ACM (or dust and debris containing asbestos fibers) is possible:

- . Approval should be obtained from the asbestos program manager before beginning work. The asbestos program manager or supervisor should make an initial visit to the work site.
- . The work should be scheduled after normal working hours (nights or weekends), if possible, or access to the work area should be controlled, doors should be locked from the inside and signs posted to prevent unauthorized persons from entering the work area (e.g., "MAINTENANCE WORK IN PROGRESS, DO NOT ENTER", or, if asbestos levels are high enough to trigger the OSHA Rule (the PEL or higher), "DANGER - ASBESTOS: CANCER AND LUNG DISEASE HAZARD: AUTHORIZED PERSONNEL ONLY: RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA"). Note, emergency exits must remain in operation.
- . The air-handling system should be shut off or temporarily modified to prevent the distribution of any released fibers to areas outside the work site.
- . A 6-mil polyethylene plastic drop cloth should be placed beneath the location of the maintenance work, extending at least 10 feet beyond all sides of the work site. Alternatively, a rectangular enclosure constructed of 6-mil plastic on a frame can be positioned underneath the maintenance area to inhibit the spread of fibers from fallen ACM (mobile enclosures of this type are available commercially).
- . Workers should wear at least air-purifying respirators with HEPA filters and protective clothing including a body suit and hood.
- . The ACM in the vicinity of the maintenance work should be misted lightly with amended water. Use a mister that produces a very fine spray. Be sure that the electrical system is shut off before spraying around any electrical conduits or fixtures.
- . After the maintenance work is completed, the fixture, register, or other component, and all tools, ladders and other equipment should be HEPA vacuumed or wiped with a damp cloth.
- . If any debris is apparent on the drop cloth, floor or elsewhere, it should be HEPA vacuumed.
- . The plastic drop cloth (or enclosure) should be wiped with a damp cloth, carefully folded, and discarded as asbestos waste.
- . All cloths, vacuum bags/filters, and other disposable materials should be discarded in sealed and labeled plastic bags as asbestos waste.

- . Workers should wear HEPA vacuum respirators and protective clothing at the work site. The clothing should then be discarded as asbestos waste. If the ACM was disturbed during the course of the work, the workers should leave their respirators on, proceed to a shower room, shower with respirators on, and clean their respirators while in the shower.

Disturbance of ACM Intended or Likely

Some maintenance and repair activities will, unavoidably disturb the ACM. For example, installing new sprinkler or piping systems will necessitate hanging pipes from structural members or ceiling. If the beams or ceiling are insulated with ACM, the ACM will be scraped away to install hangers. Likewise, pulling cables or wires through spaces with ACM or ACM debris is likely to dislodge pieces of the ACM or disturb ACM debris. Furthermore, anytime tiles are moved to enter the space above a suspended ceiling, settled dust on top of the tiles will be resuspended. If the beams or decking above the ceiling are covered with ACM, the dust is likely to contain asbestos fibers. All of these examples involve disturbance of ACM or asbestos dust and debris and will likely result in elevated levels of airborne asbestos fibers.

Small Disturbances

The following procedures are appropriate for maintenance activities which involve small-scale (less than 3 square feet) removal of surfacing ACM or when disturbance of ACM dust and debris or unintentional contact with the ACM is likely.

- . Approval should be obtained from the asbestos program manager before beginning work, and the work should be supervised.
- . The work should be scheduled after normal working hours (nights or weekends), if possible, or access to the work area should be controlled: doors should be locked from the inside and signs posted to prevent unauthorized persons from entering the work area (e.g., "MAINTENANCE WORK IN PROGRESS, DO NOT ENTER", or, if the asbestos levels are high enough to trigger the OSHA Rule (the PEL or higher), "DANGER - ASBESTOS: CANCER AND LUNG DISEASE HAZARD: AUTHORIZED PERSONNEL ONLY: RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA"). Note, emergency exits must remain in operation.
- . The air handling system should be shut off or temporarily modified to prevent the distribution of fibers from the work site to other areas in the building.
- . Workers should wear, at a minimum, powered air purifying respirators with HEPA filters and protective clothing, including a body suit, hood, boots and gloves.

- . A 6-mil polyethylene plastic drop cloth should be placed beneath the location of the maintenance work, extending at least 10 feet beyond all sides of the work site (in the case of entry into the space above a suspended ceiling, the work site should be the area of the tiles removed to gain access). Alternatively, a rectangular enclosure constructed of 6-mil plastic on a frame can be positioned underneath the maintenance area to inhibit the spread of fibers from fallen ACM (mobile enclosures of this type are available commercially).
- . If entry to the space above a suspended ceiling is necessary, the entry tile(s) should be removed carefully with as little jarring as possible. The air above the opening, the top of the removed tile, and all tiles surrounding the opening, and the ACM likely to be disturbed should be misted with amended water. Use a mister with a very fine spray. A thorough misting in the air helps fibers to settle more quickly. Cleaning ceiling tiles with a HEPA vacuum cleaner is also effective as long as care is taken not to vibrate tiles and disturb the ACM.
- . Selected workers must wear personal monitors as required by OSHA unless previous experience with the same ACM and similar operations indicates that fiber levels are likely to be less than the PEL.
- . During the course of the work, any ACM which is removed should be collected by the HEPA vacuum. This is best accomplished by placing the vacuum hose just below the ACM being removed.
- . Upon completion of the work, any visible debris on the top of the suspended ceiling, on the drop cloth, on the floor, or anywhere else should be collected by cleaning with a HEPA vacuum.
- . All equipment and tools should be wiped with damp cloths or HEPA vacuumed.
- . The plastic sheet should be wiped with a damp cloth, carefully folded, and discarded as asbestos waste.
- . All debris, cloths, and vacuum bags/filters should be discarded in sealed and labeled plastic bags as asbestos waste.
- . Workers should vacuum their disposable suits before leaving the work site (or remove and discard them as asbestos waste and put on a clean disposable suit), proceed to a shower room, shower with their respirators on, and clean their respirators while in the shower.

Large Disturbances

Any maintenance work which involves removal of 3 or more square feet of surfacing material (or 3 linear feet of thermal system insulation) should be considered a large scale disturbance of ACM. Moreover, if the maintenance work is part of a general building renovation, NESHAPS require prior removal of ACM if more than about 160 square feet of friable surfacing ACM (or about 260 linear feet of thermal system insulation) should be broken up or made inaccessible for subsequent removal (40 CFR 61, subpart M - see Chapter 1 and Appendix C of the 1985 EPA Guidance Document). Even if NESHAPS does not strictly apply, building owners should consider removing all ACM from that part of the building where this type of maintenance work is planned. Typically, an outside abatement contractor would be hired for the removal project before the maintenance work would begin. If this approach is not deemed necessary or desirable, the maintenance workers should be fully trained in asbestos removal and the work should proceed as follows:

- . All of the procedures for asbestos removal should be followed: construction of containment barriers and decontamination facilities; use of a negative pressure ventilation system; use of protective clothing and "type C" respirators by workers; proper disposal of asbestos debris; and proper cleanup of the work site followed by air testing. Most of these procedures are required by OSHA (see Chapters 5 and 6 of the purple book and the OSHA Rule for the construction industry for a detailed discussion of these steps). Personal air monitoring is also required by OSHA unless SCBA or "type C" respirators used.
- . Once the work site has been adequately isolated and all precautionary measures have been taken, the maintenance should begin. If the work involves cutting, drilling, grinding, or sanding the ACM, special tools equipped with HEPA vacuum attachments must be used (OSHA requirement). Where the ACM is simply scraped off the substrate, the hose from a HEPA vacuum cleaner should be placed just below the removal site to catch the ACM. Upon completion of the work, the vacuum bags and filters should be discarded as asbestos waste.
- . Where the ACM was disturbed as part of the maintenance activity, it should be repaired with non-asbestos plaster or spackling compound or sprayed/painted with an encapsulant or latex paint (see Section 5.1.3 of the purple book for specifications). This should be done before final clean up of the work site.

THERMAL SYSTEMS INSULATION

Maintenance activities affecting asbestos-containing thermal system insulation generally involve plumbing-type repairs, or repairs to the heating, ventilation and air conditioning (HVAC) system. Frequently, the ACM must be removed to provide access to the valve, flange, duct, or related system part needing maintenance.

Contact With ACM Unlikely

Maintenance activities or repairs which can be performed without contacting or disturbing the ACM require little more than normal care and good workmanship (respirators and a HEPA vacuum cleaner should be available if needed). For example, valves which are either uncovered or covered with non-asbestos insulation can be repacked or repaired without disturbing asbestos lagging on nearby pipes. As with surfacing ACM, the only precautions necessary are to make sure that a HEPA vacuum cleaner and air-purifying respirators are available if needed.

Accidental Disturbance of ACM Possible

Even maintenance tasks that involve no direct contact with ACM may cause accidental disturbance. For example, vibrations created by maintenance activities in one part of piping network will be transmitted to other parts. Vibrations could then cause fibers to be released from insulation which is exposed (not covered with a protective jacket) or not in good condition. If in doubt about the possibility of fiber release, thoroughly inspect the thermal system insulation before undertaking the maintenance or repair work. Then, either correct the problem before starting, or assume that the maintenance work may cause accidental disturbance and fiber release. In this case, the following procedures should be used:

- . Work approval and site preparation procedures as described under Surfacing Material should be followed.
- . Plastic sheets (6-mil polyethylene) should be cut and taped around any insulation which may be accidentally disturbed. The plastic should be misted with amended water before taping it shut. If the locations where insulation could be disturbed are too numerous for isolation with plastic, workers should perform the maintenance work wearing air-purifying respirators, at a minimum, and protective clothing, including disposable suits and hoods.
- . Cleanup procedures, as described under Surfacing Material, should be followed. Special care should be taken when removing the plastic from the insulation to minimize disturbance of any ACM dust or debris that may have fallen from the insulation.

Disturbance of ACM Intended or Likely

Where asbestos-containing insulation must be removed to maintain or repair the thermal system, the ACM will obviously be disturbed. As with surfacing ACM, the amount to be removed or manipulated will determine the procedures to be used.

- . Work approval and site preparation procedures as described for surfacing ACM, should be followed.
- . Maintenance workers should wear at least air-purifying respirators with HEPA filters and protective clothing (suit, hood, and boots) in case of a fiber release accident.
- . The asbestos-containing insulation should be removed as necessary for the repairs, and the repairs made using standard glove bag techniques, where possible, (see the EPA publication: "Asbestos-in-Buildings Technical Bulletin: Abatement of Asbestos-Containing Pipe Insulation", 1986-2 and the OSHA construction industry rule). Glove bags are fastened around the part to be repaired, the insulation is removed with knives and saws to make the part accessible, and the repairs are made using tools contained in the glove bag tool pouch. The open faces of the remaining asbestos-containing insulation are then sealed with an encapsulant or latex paint, all surfaces are wet wiped or HEPA vacuumed, and all debris is sealed in the glove bag and removed, together with the bag.
- . If the bag is ruptured during the course of the repairs, work should stop, the area should be sealed off, and all procedures recommended for large scale asbestos removal should be followed. Thorough cleanup of the work site, followed by air testing is, especially important to assure that fibers which may have escaped are removed. Sealing tape applied quickly to a small puncture could prevent significant release of fibers to the room, provided the ACM inside the bag was thoroughly wetted as it was removed.
- . At the conclusion of the work, maintenance workers should clean their clothing as above (if fibers escaped from the glove bag), shower with their respirators on, and clean their respirators while in the shower.
- . All glove bags and any other used materials (including disposable clothing) should be discarded as asbestos waste.
- . Non-asbestos insulating material can be installed, as necessary, to replace insulation which was removed.

Large Disturbances

Maintenance activities which involve remove of 3 linear feet or more of asbestos-containing insulation (e.g., several valves need attention in a utility room or block insulation needs to be removed for boiler repair) should be considered large scale disturbances. In some situations, glove bag techniques may be appropriate and the procedures described above under "small disturbances" should be followed. When glove bags are not feasible, the maintenance activities should be conducted using all the procedures recommended for large scale asbestos removal. ACM removal is typically conducted by abatement contractors. If maintenance personnel are to conduct the removal, they must be thoroughly trained in removal techniques (OSHA requirement). The choice between conducting multiple glove bag operations and isolating the entire work site is largely one of convenience and cost. However, if the maintenance activities are likely to cause disturbance of ACM on pipes, boilers, or ducts at sites other than just those undergoing repair (due to vibration, for example), then the entire room or area should be isolated and large scale asbestos removal procedures employed. NESHAPS regulations require that asbestos-containing thermal system insulation be removed prior to building renovation if 260 linear feet or more of ACM would be broken up or made inaccessible for subsequent removal prior to demolition (as noted in the previous section, NESHAPS, also requires the removal of friable surfacing ACM prior to renovation or demolition if 160 square feet or more of material would be broken up or made inaccessible).

OTHER ACM

Other types of ACM should also be addressed in the special O & M Program. They include vinyl asbestos floor tiles, asbestos ceiling tiles, transite wall board and counter tops, asbestos roof tiles, and various textile products such as stage curtains. Disturbance of these materials should be avoided. Where this is not possible, procedures should be used as described above for large scale removal of ACM. Cutting, drilling, grinding, or sanding of ACM must be performed with tools equipped with HEPA A-filtered vacuum systems (OSHA requirement).

OTHER MEASURES

Whenever friable ACM is present in a building, special procedures should be followed when changing filters in the HVAC System. The filters should be misted with water or amended water as they are removed, placed in plastic bags, sealed, and discarded as asbestos waste. Workers should wear at least an air-purifying respirator.

Item 5

Locations of Building Asbestos-Containing Materials

Table I in Part I of this document presents the location of identified Asbestos Materials in the Penn Manor School District. This table is integral to the plan and must be included in each copy of the plan. The Penn Manor School District shall implement an Operations, Maintenance, and Repair (O & M) Program whenever any friable ACBM is present or assumed to be present in it's buildings.

AREAS WITH FRIABLE ACBM PRESENT

A. Penn Manor High School

1. Boiler Room
2. Auditorium Stage Area and Storeroom
3. Projection Booth
4. Junior Boys and Girls Locker Rooms
5. Printing Room
6. Agricultural Shop Areas
7. Shops #2 and #3
8. Laundry Room
9. Wrestling Team Shower Room
10. Janitor's Room (Between Rooms #101 and #103)
11. Auxiliary Gyms
12. Mechanical Rooms (Adjacent to Gyms 1A and 1B)

B. Penn Manor 9th Grade Building

1. Boiler Room
2. Boys and Girls Locker Rooms
3. Above Ceilings (Entire School)

C. A. Letort Elementary School

1. Boiler Room

D. Central Manor Elementary School

1. Boiler Room

E. Conestoga Elementary School

1. Boiler Room
2. Plumbing Chase (Adjacent to Lobby)
3. Crawlspace

F. Fred Eshelman Elementary School

1. Boiler Room

G. Hambright Elementary School

1. Boiler Room

H. Martic Elementary School

1. Plumbing Chases
2. Crawlspace

I. Pequea Elementary School

1. Boiler Room
2. Plumbing Chases
3. Piping Tunnels

Item 6

Periodic Inspections

Table I presents the results of the Penn Manor School Districts Asbestos Assessment and Inventory Study performed in December 1987 and January 1988. All asbestos materials identified in this study will be inspected and evaluated according to the following schedule:

. Initial Reinspection

An initial reinspection will be performed by the Penn Manor School District/Industrial Hygienist in July, 1988.

Summer 1989

. Reinspection

A reinspection of all identified asbestos material will be performed by the 6 month anniversary of the Initial Reinspection. Inspection of asbestos material will be performed every 6 months by the Asbestos Control Manager and the Industrial Hygienist. At least once every three years after a Management Plan is in effect, a reinspection of all friable and non-friable known or assumed ACM will be conducted. The inspection shall be made by an EPA accredited inspector. The reinspection by an EPA accredited inspector shall be performed by January, 1991.

Periodic ACM Surveillance

Periodic review of the O & M program is essential to insure that the program objectives are being met. A key feature of the review is reinspection of all ACM in the building. Combined with ongoing reports of changes in the condition of the ACM made by service workers, the reinspection will ensure that any damages or deterioration of the ACM will be detected and corrective action taken. Reinspection should be conducted at least annually; more frequently if necessary. The assessment factors described in "Guidance for Assessing and Managing Exposure to Asbestos" should

REASSESSMENT OF ASBESTOS-CONTAINING MATERIALS

Location of asbestos-containing material(s) (address, building, room(s), or general description): _____

Type of asbestos-containing material(s):

1. Sprayed- or troweled-on ceilings or walls
2. Sprayed- or troweled-on structural members
3. Insulation on pipes, tanks, or boilers
4. Other (describe): _____

Abatement Status:

1. The material has been encapsulated _____, enclosed _____, neither _____

Assessment:

1. Evidence of physical damage: _____

2. Evidence of water damage: _____

3. Evidence of delamination or other deterioration: _____

4. Degree of accessibility of the material: _____

5. Degree of activity near the material: _____

6. Location in an air plenum, air shaft, or airstream: _____

7. Other observations (including the condition of the encapsulant or enclosure, if any): _____

Signed: _____ Date: _____
(evaluator)

Figure 4. Form for recording information during ACM reassessment.

be used to evaluate each homogeneous area of surfacing ACM and thermal system insulation (a homogeneous area is an area of ACM which appears to be the same date of application, texture, color, and overall appearance). The assessment factors are: ACM condition (deterioration, physical damage, and water damage), potential for disturbance (accessibility of the ACM, sources of vibration near the ACM, and potential for air erosion), and location of the ACM in or near air plenums, air shafts, or elevator shafts. Either the asbestos program manager, or someone trained or experienced in ACM assessment, should conduct the inspections. The results should be documented (see Figure I) and placed in the permanent asbestos file. EPA's "Guidance for Assessing and Managing Exposure to Asbestos In Buildings" should be followed to determine when response actions, in addition to an O & M program are needed, and how to implement them.

Air monitoring could supplement the physical inspection. If air monitoring is conducted, transmission electron microscopy (TEM), not PCM, should be used to count and identify the airborne fibers. Only TEM can detect the small asbestos fibers typically found in buildings with ACM (large scale disturbance of ACM will release larger fibers detectable by PCM). Since analysis by TEM is expensive, air monitoring which employs TEM is typically used on a one-time basis and provides a "snap-shot" view of building conditions. Such a one-time view can be very misleading because airborne asbestos levels vary from day to day and from room to room. Low readings are, therefore, possible even when the ACM is in poor condition. For this reason, EPA does not recommend air monitoring for the initial assessment of exposure potential (see Chapter 4 of the purple book). However, if the ACM is currently in good condition, increases in airborne asbestos levels may provide an early warning of deterioration or disturbance of the ACM.

To use air monitoring in an "early warning" context, a baseline asbestos level should be established soon after the O & M program is initiated. Periodic air monitoring (perhaps conducted simultaneously with the reinspection) would then be used to determine if asbestos levels have changed relative to the baseline. Although this use of air monitoring is appropriate and useful in concept, it will still be expensive.

If the air monitoring is used in the ACM surveillance component of the O & M program, the air sampling and sample analysis procedures described in the silver book should be employed. At least five samples should be collected to establish a baseline, followed by at least five additional samples during each quarterly reinspection of the ACM. Sequential sets of five samples can be averaged and averages compared statistically (as described in the silver book for clearance monitoring) to determine whether asbestos concentrations are increasing. Note that aggressive sampling should NOT be used in any area where ACM is present. Special training or expert advice is needed to design and operate an air-monitoring program.

Measuring dust accumulation for asbestos is another way to supplement physical reinspection. A trend of increasing asbestos content in dust samples would be evidence for release of asbestos fibers in the building. Although dust measurement is becoming more popular, no standardized collection and analysis procedures are available. Some asbestos consultants use an air sampling pump to "vacuum" fibers from surfaces; others favor some sort of "wipe sample" method. EPA is currently evaluating several collection and analysis protocols for asbestos dust. Until this study is concluded, EPA does not recommend dust measurement as part of ACM surveillance is an O & M program.

Item 7

Training for Building Occupants

Penn Manor School District has plans for removal of ACBM, as recommended in Table I of Part I, in the Central Manor and Hambright Elementary Schools during the summer of 1988. Penn Manor School District shall ensure, prior to the implementation of the O & M provisions of the Management Plan, that all members of its maintenance and custodial staff who may work in a building that contains ACBM receive a 2-hour awareness training session. The fourteen hour training session for the Maintenance and Custodial staff in the School District who are to conduct any activities that will result in the disturbance of ACBM shall be scheduled prior to implementation of the O & M Plan.

Item 8

Respiratory Protection Program

The Penn Manor School District will provide a safe and healthful workplace for all district workers. Presented below is a Respiratory Protection Plan for Maintenance and Custodial Workers who may be involved with Asbestos Removal/Repair or Clean-up. Additional Respiratory Protection and Safety/Health Procedures are contained in Appendix III.

1. Maintenance Workers shall be provided and fit tested with half-mask respirators. Workers are responsible for the care and maintenance of their respirator as outlined in Appendix I. Respirators shall be cleaned following each use and the cartridge changed at the end of each days use.
2. Maintenance Workers will wear Tyvek anti-contamination clothing when performing asbestos work. Undergarments and clothing will be wetted in the decontamination unit and bagged. This clothing shall be washed separately from outer clothing.

3. All Maintenance Workers shall have a respirator fit test every 6 months to assure a good facial seal between the mask and the user's face. Respirator fit testing shall be performed by the Industrial Hygienist. Under no circumstances, may a worker have facial hair that interferes with the seal of the sideburns, etc. Maintenance Workers must be clean showered on the morning of their respirator usage.
4. The Maintenance Workers shall be individually fit tested with a respirator that fits him/her. Under this plan, respirators cannot be exchanged between Maintenance Workers or with other personnel.

Item 9

Medical Surveillance Program

Maintenance Workers shall be provided with annual "Asbestos Physicals" according to the OSHA Asbestos Standard (29 CFR 1926.58 and 29 CFR 1910.1001) and the U.S. EPA Worker Protection Rule (40 CFR 763.120).

The main requirements of the medical surveillance program are the initial and periodic examinations. The initial examination can be omitted if the employee has had an equitable exam within the last twelve months. Periodic examinations are required at least annually, and must be performed before the Maintenance Worker is issued and required to wear a negative pressure respirator.

Each examination must include, at a minimum:

1. Completion of the mandatory medical questionnaires. There is one each for the initial and periodic examinations. These questionnaires include sections to complete on work history.
2. A physical examination, with emphasis on the cardiovascular and gastrointestinal systems.
3. A pulmonary function test, which includes the forced vital capacity (FVC) and the forced expiratory volume in one second (FEV).

The examining physician may also require other tests as part of the medical examination. The chest x-ray is now optional and is administered at the discretion of the physician. It is recommended that an initial chest x-ray be used in order to establish baseline conditions for the employee.

Following the examination, the physician must provide the employer with the following:

1. A written opinion as to whether the employee has any detected medical conditions that would place the employee at increased risk of health impairment from exposure to asbestos.
2. Any recommended invitations on the employee or on the use of personal protective equipment, such as respirators.
3. A statement that the employer has been informed by the physician of the results of the medical examination, and of any medical conditions that may result from asbestos exposure.

The employer must provide the examining physician with the following:

1. A copy of the OSHA Asbestos Standard
2. A description of the employees duties as they relate to asbestos
3. The employees actual or anticipated level of exposure
4. A description of any personal protective and respiratory equipment used or to be used
5. Information from previous medical examinations of the employee that is not otherwise available to the examining physician. Also, a copy of the physicians written statement to the employee within 30 days of receipt must be provided. Finally, Penn Manor School District must maintain medical records for at least 30 years following termination of employment.

Item 10

Maintenance Renovation Permit System

In order to administratively control the disruption of ACM during maintenance and renovation operations, a work permit system, where all work orders or requests are funneled through the asbestos program manager, shall be initiated (see Sample Permit, Figure 2).

In the permit system, all requests for maintenance/renovation activities are given to the Asbestos Program Manager prior to the issuance of a work order to proceed. The program manager then needs to check the buildings asbestos records for information concerning the presence of ACM where work is to be performed.

Figure 1

Permit application for performing maintenance/renovation work

1. **Exact location of area involved (including building number, room number, location within room, etc)** _____

2. **Description of work involved.** _____

3. **Starting Date** _____ **Anticipated Completion Date** _____
4. ***Approximate amount of asbestos present (linear feet, square feet, size of tank, etc).** _____

5. ***Asbestos control methods to be used (i.e. glovebag, HEPA vacuum, wet methods etc).** _____

6. ***Protective equipment to be used (respirator, coveralls etc).** _____

7. **Name and telephone number/extension of supervisor.** _____

TO BE FILLED OUT BY ASBESTOS PROGRAM MANAGER:

Permit _____ **Accepted** _____ **Rejected** _____
Signed _____ **Print** _____
Permit Number _____
Emergency contact _____

Please return this form to:

Name
Address or Mail Stop
Telephone or Extension

***Note: These items may have to be filled out by asbestos program manager**

The area may need to be physically inspected to ensure records reflect actual conditions. If no asbestos is present, the work order is issued and the planned action can proceed. If ACM is present, the program manager will inform the trained maintenance/renovation workers of the presence of asbestos and equip the workers with the proper personnel protective equipment required to deal with the ACM during the planned work. If large amounts of ACM are included, non-critical maintenance/renovation work shall be deferred until the ACM in the area can be handled by qualified Asbestos Abatement Contractor firms.

Item 11

Emergency Response Procedures

As long as ACM remains in the building, a fiber release episode could occur. Custodial and maintenance workers should report to the asbestos program manager the presence of debris on the floor, water or physical damage to the ACM, or any other evidence of possible fiber release. Fiber release episodes can also occur during maintenance or renovation projects. The asbestos program manager should call an Abatement Contractor or assign a suitably trained in-house team to clean up debris and make repairs as soon as possible. If an outside contractor is to be used, a company should be selected and retained by contract for quick response action as needed.

Minor Episodes

Minor episodes, such as a small section of insulation (less than 3 linear feet) falling from a pipe or a careless worker bumping into a beam and dislodging a small amount of fireproofing ACM (less than 3 square feet), can be treated with standard wet cleaning and HEPA vacuum techniques:

- Workers should wear air-purifying respirators with HEPA filters, at a minimum
- Workers should thoroughly saturate the debris with water or amended water using a mister with a very fine spray. The debris should then be placed in a labeled, 6-mil plastic bag for disposal and the floor should be cleaned with damp cloths or a mop. Alternatively, the debris can be collected with a HEPA vacuum cleaner.
- All debris and materials used in the cleanup should be discarded as asbestos waste.
- Workers should vacuum their disposable suits before leaving the work site (or remove them, discard them as asbestos waste, and put on clean, disposable suits), proceed to a shower room, shower with their respirators on, and clean their respirators while in the shower.

- The damaged ACM should be repaired with asbestos-free spackling, plaster, cement, or insulation, or sealed with latex paint or an encapsulant.

Major Episodes

Major fiber release episodes are serious events. Large amounts of ACM falling from heights of several feet may contaminate an entire building with asbestos fibers. If 3 square feet or more of surfacing ACM or 3 linear feet or more of thermal system insulation delaminates or is dislodged from its substrate, the episode should be considered major. A large breach in a containment barrier for a maintenance or abatement project should also be considered a major episode. The following response procedures should be used:

- The area should be isolated as soon as possible after the ACM debris is discovered. Where the area can be sealed by doors, they should be locked from the inside (escape corridors must remain in operation) and signs posted to prevent unauthorized personnel from entering the work area ("DANGER - ASBESTOS; CANCER AND LUNG DISEASE HAZARD; AUTHORIZED PERSONNEL ONLY; RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA").
- The air handling system should be shut off or temporarily modified to prevent the distribution of fibers from the work site to other areas of the building. If possible, doors, windows, and air registers should be sealed with 6-mil plastic sheets and tape.
- All the procedures recommended by EPA and required by OSHA for large scale removal of ACM should then be used. These include containment barrier, negative pressure ventilation, personal respiratory protection and protective clothing, decontamination facilities, and air testing.
- Workers should wear either a SCBA or "type C" respirator (see discussion in Building Inspection Notebook on respirator programs) and protective clothing, including a body suit, hood, boots, and gloves. Personal air monitoring may be conducted on representative workers, but is not required by OSHA when SCBA or "type C" respirators are used.
- Fallen debris should be sprayed with amended water and placed in plastic bags for disposal. Shovels are useful for collecting the debris. The floor should be thoroughly cleaned with a HEPA vacuum cleaner.
- Walls, ceilings, pipes, boilers, or other surfaces where ACM was damaged or delaminated should be repaired temporarily. This might involve replastering with asbestos-free material, spraying with an encapsulant, or taping with duct tape. In

FIBER RELEASE EPISODE REPORT

1. Address, building, and room number(s) (or description of area) where episode occurred: _____

2. The release episode was reported by _____
on _____ **(date).**

3. Describe the episode: _____

4. The asbestos-containing material was _____ **/ was not** _____ **cleaned up**
according to approved procedures. Describe the cleanup:

Signed: _____ **Date:** _____

(Asbestos Program Manager)

some cases, ACM beyond the immediate area of damage may need to be removed to prevent additional episodes.

- . The air should be tested for asbestos fibers before the plastic barriers are removed and the area reoccupied. Testing should follow guidelines in Chapter 6 of the purple book and Chapter 4 of the silver book. That is, air should be sampled at the specific number of locations and analyzed by either phase contrast microscopy or transmission electron microscopy. However, sampling should NOT be done aggressively since the use of blowers and fans may dislodge fibers from the remaining ACM.
- . After the barriers have been taken down, a decontamination of the entire building or a portion of it should be considered. The need for this will depend on how rapidly the response team reacted to the episode and, in particular, how quickly the HVAC system was turned off. A thorough decontamination includes HEPA vacuuming and/or wet wiping all carpets, furniture, and other surfaces. Decontamination of the HVAC system would involve disassembling and cleaning (HEPA vacuuming or wet wiping) ducts, ventilators, registers, and other system parts. System filters should also be removed and replaced.
- . All equipment used in the cleanup operation should be washed or wiped with damp cloths. All disposable materials (e.g., cloths, mop heads, filters, coveralls) should be discarded as asbestos waste.

Each fiber release episode should be documented. A report format is suggested in Figure 3. These procedures should be employed whether the building owner uses in-house staff or an outside asbestos abatement contractor. If an outside contractor is used, the procedures should be thoroughly discussed and proper training of the contractors crew assured before signing the contract.

Work Practices for Renovation and Remodeling

Renovation

Building renovation or building system replacement can cause major disturbance of ACM. Moving wall, adding wings, and replacing heating or air conditioning systems involve breaking, cutting, or otherwise disturbing ACM that may be present. Prior removal of ACM is highly recommended in these situations, and is required by NESHAPS if the amount of ACM likely to be disturbed is greater than the threshold amounts (160 square feet of surfacing material or 260 linear feet of thermal system insulation). If prior removal is not undertaken, the renovation project should be considered equivalent to an asbestos removal project. All the procedures and precautions for asbestos removal recommended by EPA and required by OSHA as previously discussed

should be employed. A key step in considering a renovation project is checking on the location and type of ACM that may be affected. Clearance should be obtained from the asbestos program manager before serious project planning is begun.

Remodeling

Remodeling or redecorating implies less dramatic structural alteration. However, disturbance of ACM or materials contaminated with asbestos fibers is still possible. Where the remodeling involves direct contact with ACM (e.g., painting or wall papering over ACM), all of the procedures and precautions recommended by EPA and required by OSHA for asbestos removal should be followed.

If "other" types of ACM have to be removed as part of the renovation project, the removal should be done with care to avoid breaking the material. For example, small sections of asbestos-containing floor tiles can be removed by applying dry ice or heat from a portable heater to the tops of the tiles and then prying them up. Glued carpet may require a mechanical chipper to separate the carpet from the floor. Before a chipper is employed, test the carpet adhesive for asbestos. If it contains asbestos, all workers should wear either SCBA or "type C" respirators and the project should be treated as an asbestos removal project.

Item 12

Recordkeeping

All written records discussed in this section should be maintained as part of a thorough recordkeeping process. To review, these include:

- . The written O & M Plan itself, including work practices;
- . Building Plans and Drawings;
- . Survey Data;
- . Copies of Notification and Warning Programs;
- . Descriptions, times, dates, and attendants of training programs;
- . Written Respiratory Protection Program;
- . Medical Surveillance Records;
- . Copies of all Permits and Documents of Custodial, Maintenance, Renovation, and Emergency Response Actions Performed;

Periodic ACM Surveillance Records

OSHA requires that records of exposure measurement (air sampling) be retained for at least 30 years. Records for each employee subject to the medical surveillance program must be maintained for the duration of employment, plus 30 years. All employment training records must be retained for the duration of employment, plus one year.

OSHA requires that each employees record of exposure and medical surveillance be made available to the employee. EPA recommends that all written elements of the O & M Program similarly be made available for inspection.

The various types of documents and records that must be retained include:

- I. Copies of notification statements, meeting agenda (with attendance lists), informational brochures, etc., for employees, building occupants, employee organizations (e.g., labor unions, PTAs).
- II. Training Records
 - A. Employees Name
 - B. Job Title
 - C. Date Training Completed
 - D. Location of Training, Including Organizations Name
 - E. Number of Hours Completed
- III. Air Sampling Collection
 - A. Name and Signature of Person Collecting Samples
 - B. Location Samples Were Collected
 - C. Name and Address of Laboratory Analyzing Samples
 - D. Date of Analysis
 - E. Method of Analysis
 - F. Results
 - G. Name and Signature of Analyst

IV. Preventative Measures and/or Response Actions

- A. Detailed Written Description of the Measures of Action**
- B. Methods Used**
- C. Location**
- D. Documentation on Why a Specific Measure or Action was Selected**
- E. Start and Completion Dates of All Work**
- F. Names and Addresses of All Contractors Involved**
- G. Any Certification/Accreditation Numbers and/or Reference Statements**
- H. If ACM was Removed, Name and Location of Storage or Disposal Sites**

V. Periodic Surveillance

- A. Date**
- B. Inspector**
- C. Notation of Changes (or lack of) in the Condition of the ACM**

VI. Cleaning (Each Instance)

- A. Name of Person(s) Doing Cleaning**
- B. Date**
- C. Locations Cleared**
- D. Methods Used in Cleaning**

VII. O & M Plan Implementation

- A. Name of Person(s) Involved**
- B. Start and Finish Dates of Action**
- C. Locations**
- D. Description of Action, Including Methods and Preventative Measures Taken**

- E. If ACM Removed, Name and Location of Storage/Disposal Site

VIII. Renovation or Repairs Involving ACM

- A. Name and Signature of Contractor
- B. Certification/Accreditation Numbers of Contractor
- C. Start and Finish Dates of Project
- D. Location(s)
- E. Description of Project, Including Preventative Measures Taken
- F. If ACM Removed, Name and Location of Storage/Disposal Site

IX. Fiber Release Episodes

- A. Date of Episode
- B. Location
- C. Method of Repair
- D. Response Action
- E. Name(s) of Person(s) Performing Work
- F. If ACM is Removed, Name and Location of Storage/Disposal Site

X. Other

- A. Complete Historical Blueprint of Facility, if Available
- B. Any Documentation on Materials/Products Used in Construction or Renovation of the Facility that may Contain Asbestos (Include any Correspondence with Manufacturers)
- C. Copy of Complete and Up-To-Date Management Plan
- D. Location and Photographs of Warning Signs and Barriers Placed to Prevent Unauthorized Access to Area of ACM

- E. All Documents and Results Pertaining to the Initial Facility Survey
- F. Required State and Federal Forms Dealing with Notification and Compliance
- G. All Correspondence Pertaining to the Asbestos Issue in the Facility
- H. Any Employee Organization or Employee Requests for Meetings, Information, etc. Regarding Asbestos in the Facility

Historical documentation can only make renovation and adaptation easier in any facility. The legal liabilities involved with asbestos are complex and the more thorough the documentation, the more defensible are the actions taken. That the health of those working in or using the facility was not compromised is also important. Poor or sloppy recordkeeping could imply callousness toward those affected, or even place the organization at an increased legal risk.

Should omissions or errors in the documentation process, make clear attempts to rectify the error, an honest admittance of an error and a valid attempt to correct it will illustrate a complete and effective documentation process.

JOB REQUEST FORM FOR MAINTENANCE WORK

NAME: _____ DATE: _____

TELEPHONE NO. _____

1. Address, building, and room number(s) (or description of area) where work is to be performed:

2. Requested starting date: _____

3. Anticipated finish date: _____

4. Description of work:

5. Description of any asbestos-containing material that might be affected (include location and type):

6. Name and telephone number of requester: _____

7. Name and telephone number of supervisor: _____

Submit this application to:

NOTE: An application must be submitted for all maintenance work whether or not asbestos-containing material might be affected. An authorization must then be received before any work can proceed.

_____ Approved (Job Request No. ____)

_____ Denied

Figure 5. Application form for maintenance work approval.

MAINTENANCE WORK APPROVAL FORM

No. _____

1. AUTHORIZATION

Authorization is given to _____ to proceed with the following maintenance work:

2. PRESENCE OF ASBESTOS-CONTAINING MATERIALS

Asbestos-containing materials are/are not (circle one) present in the vicinity of the maintenance work.

3. WORK PRACTICES IF ASBESTOS-CONTAINING MATERIALS ARE PRESENT

The following work practices shall be employed to avoid or minimize the disturbance of asbestos:

(See O & M Program sections concerning ACM Disturbance)

4. PERSONNEL PROTECTION IF ASBESTOS-CONTAINING MATERIALS ARE PRESENT

The following equipment/clothes shall be used/worn during the work: _____

(See Respiratory Protection Section)

SIGNED: _____ DATE: _____

(Asbestos Program Manager)

Figure 6. Maintenance work approval form.

EVALUATION OF WORK AFFECTING
ASBESTOS-CONTAINING MATERIALS

No. _____

This evaluation covers the following maintenance work:

1. Location of work (address, building, room number(s), or general description): _____

2. Date(s) of work: _____
3. Description of work: _____
4. Work approval form number: _____

Evaluation of work practices employed to minimize disturbance of asbestos:

Evaluation of work practices employed to contain released fibers and to clean up the work area:

Evaluation of equipment and procedures used to protect workers:

Signed: _____ Date: _____

(Asbestos Program Manager)

Figure 7. Work evaluation form.

ITEM 13

COST ESTIMATION

The key personnel involved with cost estimation, bid solicitation, and contract specification are the Management Planner, the Plan Designer (engineer or architect), potential contractors, and the contractors chosen to perform the abatement work. The Management Planner is responsible under AHERA regulations for an evaluation of resources needed to complete the response action, to perform reinspections, and O & M activities.

These personnel will require an understanding of cost factors and cost estimation as well as procedures regarding the selection of a qualified contractor. This chapter addresses the relations for these aspects of cost estimation with the goal of minimizing variance between actual and estimated costs.

FACTORS AFFECTING ABATEMENT COSTS

Because there are a variety of cost variables involved in estimating a project, it is difficult to estimate abatement costs. Depending on the circumstances surrounding a particular abatement project, a management plan could entail removal, encapsulation, enclosure, or O & M procedures, may involve removal of different forms of asbestos, and could entail working in extreme environments. Changes in such factors may change the cost of an abatement action by an order of magnitude. Among the cost factors which must be included are:

1. Level of Inspection Activity

Initial Inspection and O & M Reinspection are generally regarded as the most predictable of project costs. AHERA Regulations specify what asbestos containing material must be inspected and how it must be inspected. For these reasons, inspection costs are usually calculated as a function of square footage.

2. Abatement Techniques

Estimated costs of different abatement techniques range from \$2-\$15 per square foot for ceiling removal. Pipe removal costs run \$5-\$15 per linear foot. These costs are removal costs only and do not include reinspection, cleaning and other activities required to complete a removal job.

The contract price associated with different projects depends in some measure on each of the following general factors;

a. Size of Project

Since Abatement is a labor-intensive construction operation, naturally the larger the job, the greater the cost.

b. Difficulty of establishing Containment Areas

Regardless of the size of the job (over a de-minimus level) containment structures must be constructed. Thus, most jobs will involve a relatively high fixed set-up cost. If the area to be worked is in irregular, has high ceilings, special floors to be protected, etc., the fixed initial costs will be higher. Scheduling other building improvement operations- renovation, replacement, redecoration, or demolition - may reduce set-up costs or other indirect expenses.

c. Amount and Application of ACM Area

Prices depend on whether asbestos was used on walls, floors, ceilings, or all three, as well as how it was applied and the type of asbestos used.

d. Quality of Contract Specification

Generally speaking, the more precise the contract specifications, i.e. the bidding document that is developed, the more competitive range of bids from qualified contractors will be obtained.

e. Bid Solicitation Procedures

Selection of a Qualified Contractor greatly reduces the later risk to additional costs or liability due to deficiencies.

COMPONENTS OF COSTS ESTIMATES

Cost estimates are generally expressed in terms which correspond closely to the unit activities needed to be carried out. Table V-1 lists typical unit operations involved in a removal job. For the contractor developing the bid, each of these operations may involve several or all of the following cost categories.

1. Air Sampling

Due to the nature of the abatement activity, air sampling is an integral part of the job. Such sampling may be related to determination of fiber concentration in or outside the work area or to personnel protection. Such sampling may require the use of a certified industrial hygienist and/or lab technician. The collection and analysis of air samples is approximately \$400 per day.

2. Labor

Asbestos abatement is a labor-intensive operation, and labor costs tend to be the largest component of total cost. Typically, labor will constitute from 40% to 50% of the total cost of the job. Labor costs include professional fees, wages, retirement funds, unemployment, health, and general liability insurance, and special allowances for increased work hazard and potential asbestos disease liability. Union scale wage rates may normally run \$25/hour for a foreman and \$12/hour for laborers. A typical removal "team" may consist

of a foreman and four laborers. Such a team may be expected to remove 50 to 100 linear feet or 100 - 200 square feet of asbestos per day depending most significantly on whether or not work is being performed at floor level.

3. Equipment

Specialized and often expensive equipment is essential to comply with the law when working with asbestos. Much of the protective equipment must be disposed after a job rather than reused. Purchase cost, depreciation, repair, and maintenance costs contribute to reusable equipment overhead. Such equipment includes supply air compressors, showers, negative air units, scaffolding.

4. Supply Costs

Abatement jobs normally require a considerable quantity and variety of consumables. Personnel protective clothing, plastic containment materials, duct tape, glovebags, surfactants, encapsulants, etc. will be required on most jobs. Supply cost would normally run approximately 5% of the total bid price.

5. Potential Liability Costs

Costs to indemnify potential losses involving property damage, longterm disease manifestation, personnel lost days or performance, and payment of contract are included as overhead cost factors.

6. Profit

Contractor's profit margin must reflect a desirable rate of return after taxes on available working capital. A higher degree of risk or retention of liability in asbestos abatement projects relative to other construction business may justify a higher rate of return.

COST ESTIMATING CONTRACT SPECIFICATIONS

The Contractor should specify a cost for each unit operation based on his estimates of the cost of labor, supplies, equipment, and testing involved in each task. Some unit operations, such as removal, will normally be segregated into removal for different types of areas (pipes, boilers, or surface areas). This breakdown is necessary since the cost per unit of asbestos removal varies drastically from area to area. Further breakdown of the removal activities may be necessary if the types of asbestos to be removed are different, if the substrate material varies, or if special working conditions exist, e.g. a difficulty in accessing the area.

Each operation will have a unit of activity associated with it. In most cases, this unit will be either square or linear feet of material removed or installed. Other units might include the number of fittings, dollars per week (for rented equipment), charge per sample (air or bulk sampling).

TABLE V-1

TYPICAL OPERATIONS IN A REMOVAL COST ESTIMATE

Develop Work Plan

Work Area Isolation

Scaffold Erection

Remove Insulation

- . Areas (wall, ceiling)
- . Boiler
- . Pipe
- . Fittings

Install Insulation

- . Areas (wall, ceiling)
- . Boiler
- . Pipe
- . Fittings

Spray Surfaces with Encapsulant

Seal Exposed Pipe Ends

Paint

Remove Wood Studs and Plastic Sheeting

Clean Dirt and Debris

Air Sampling

Repair Cracks or Splits

Bulk Sampling

Disposal of Asbestos in Landfill

ADDITIONAL ASSISTANCE

Additional assistance can be obtained from your Regional Asbestos Coordinator. Their telephone numbers are listed below:

Region I -- (617) 223-0585	Region VI -- (214) 767-5314
Region II -- (201) 321-6668	Region VII -- (913) 236-2835
Region III -- (215) 597-9859	Region VIII -- (303) 292-1742
Region IV -- (404) 347-3864	Region IX -- (415) 974-8588
Region V -- (312) 886-6006	Region X -- (206) 442-2870

Copies of the EPA Guidance Documents, Technical Bulletins, and other publications cited here can be obtained by calling, toll free: 800-424-9065 (554-1404 in Washington, D.C.).

EPA-sponsored training centers feature courses for asbestos program managers, removal project supervisors, and service workers. Training centers locations are listed on page # 41901 of the AHERA Rule 40 CFR Part 763, Asbestos-Containing Materials in Schools; EPA Approved Courses Under the Asbestos Hazard Emergency Response Act.

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