

South Carolina
Department of
Health and
Environmental
Control

WRG

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2600 Bull Street
Columbia, S.C. 29201

February 24, 1983

PLAINTIFF'S
EXHIBIT
WRG-757

Mr. Richard Dale
W. R. Grace
Route 1
Enoree, SC 29335

Re: Asbestos Removal Information and Regulations

Dear Mr. Dale:

This is in response to our telephone conversation today. I have enclosed the following information.

- 1) National Emission Standards for Hazardous Air Pollutants (NESHAP);
- 2) Sample notification form;
- 3) OSHA Regulation;
- 4) Suggested specifications for asbestos removal.

Other information which I gave you on the telephone (or should have) is as follows:

- 1) Consultation regarding compliance with OSHA regulations can be obtained through Mr. William Lybrand, Director of Occupational Health and Safety, S. C. Department of Labor, Box 11329, Columbia, S.C. 29211. He can be reached at 758-3080.
- 2) Approval must be obtained to dispose of asbestos waste in South Carolina. Ms. Lynn Cooper of the Department of Health and Environmental Control's (DHEC) Division of Hazardous and Solid Waste Management will be able to help you in this matter. She can be reached at 758-5681.
- 3) NESHAP, as it pertains to asbestos removal, addresses 4 main points:
(1) notification, (2) wetting, (3) no visible emissions, and (4) disposal in an approved landfill and burial within 24 hours.

COPIES: DANIEL
STEWART
WOLTER ✓
EATON
SCHNEIDER

- 4) At the State and Federal level, only Ms. Cooper and I must be notified prior to removal. OSHA currently does not require notification.

If you have any questions or if I can be of any assistance, please call me at (803) 758-5406.

Sincerely,

Bob Betterton

Bob Betterton
NESHAP Manager for S. C.
Air Compliance & Management Division
Bureau of Air Quality Control

RJB:llt

cc: William Lybrand, OSHA, Dept. of Labor
Lynn Cooper, DHEC, Div. of Haz. & Solid Waste Mgm.

ASBESTOS DEMOLITION/RENOVATION OPERATIONS
Bob Beisterton
AIR COMPLIANCE & ENFORCEMENT
BUREAU OF AIR QUALITY CONTROL
S. C. DEPT. OF HEALTH ENVIRONMENTAL CONTROL
2600 DUKE STREET
COLUMBIA, S. C. 29201

760207

Anyone who intends to demolish or renovate any institutional, commercial, or industrial building or structure containing more than 260 feet of pipe covered or coated with friable asbestos or more than 160 square feet of friable asbestos materials used to cover or coat any duct, boiler, tank, reactor, turbine, furnace, or structural member must provide the Bureau of Air Quality Control with written notification of the demolition or renovation. This notification shall include the information requested below and shall be sent to the department at least 10 days prior to commencement of the demolition or renovation.

- I. NAME AND ADDRESS OF DEMOLITION OR RENOVATION OPERATOR _____
- II. PERSON TO CONTACT _____ TELEPHONE _____
- III. DESCRIPTION OF BUILDING (a) Name _____
(b) Location _____
(c) Size _____ (d) Age _____
(e) Prior Use _____
(f) Approximate amount of asbestos _____
- IV. SCHEDULED STARTING AND COMPLETION DATES OF DEMOLITION _____
- V. NATURE OF DEMOLITION OR RENOVATION AND METHOD(s) TO BE EMPLOYED _____
- VI. PROCEDURES TO BE USED TO PREVENT VISIBLE EMISSIONS OF ASBESTOS
(a) Methods used at demolition site _____
(b) Methods used at waste disposal site _____
- VII. NAME AND ADDRESS OF WASTE DISPOSAL SITE _____

SIGNATURE _____

DATE _____

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AIKEN

648-9521

760208

MEMORANDUM

DATE: August 17, 1982
TO: District Air Staff
THRU: F. K. Stone, BAQC &
District Air Directors
FROM: Bob Betterton, NESHAP Manager, BAQC
SUBJ: Asbestos Removal Inspections

COLUMBIA
252-5436

Bob Betterton

Asbestos removal operations are occurring with greater frequency and will continue to do so over the next several years. This is largely due to the DHEC regulation requiring that schools sample potential asbestos sources and inform parents of the results of analysis.

The Bureau of Air Quality Control is responsible for enforcing the National Emission Standards for Hazardous Air Pollutants (NESHAP). The NESHAP manager is responsible for NESHAP within the Bureau. NESHAP regulates procedures used in removing asbestos. Therefore, the NESHAP manager is responsible for ensuring that there are no violations of NESHAP in South Carolina.

District air staff are responsible for carrying out BAQC duties statewide. The purpose of this memo is to spell out the separate responsibilities of the NESHAP manager in Columbia and the district air staff. Obviously, since this is being written, there have been occasional misunderstandings.

We are involved in asbestos removal operations at several levels. Our most basic reason for involvement is because of NESHAP. NESHAP requirements can be summarized as follows:

- 1) Written notice must be sent to the EPA Administrator or his delegated representative at least 10 days before removing friable asbestos containing material. EPA delegated NESHAP to BAQC in 1976. The NESHAP coordinator is responsible for the program in BAQC. Therefore, the NESHAP coordinator should receive the notice. If the district air person receives the notice, instead, he should forward a copy to the NESHAP manager. Copies of notifications received by the NESHAP manager will always be sent to the districts.

- 2) Asbestos must be kept wet during removal. Our legal authority for enforcing this is doubtful. I will explain this in more detail during our next asbestos training session.
- 3) There must be no visible emissions to the atmosphere during asbestos removal.
- 4) Asbestos must be buried by at least 6 inches of non-asbestos material within 24 hours of deposition at a landfill. This requirement can present jurisdictional problems with the district solid waste staff. The best policy seems to be to ask the solid waste consultant if he prefers for you or for him to handle this inspection. It needs to be inspected, however. All of the landfills which I have dealt with have handled the asbestos incorrectly the first several times.

The regulation does go into more detail about specifics such as requiring that all asbestos be removed prior to a demolition, but those are the main 4 points.

An inspection should address these 4 points as a minimum. However, we are all public health officers. As such, we have a legal and moral responsibility to evaluate these operations in a way which will protect the public health. A removal operation can be performed in compliance with the NESHAP and even the OSHA regulations and still leave the building in a condition which could pose a threat to the health of its future users. An inspection report which states that the removal was in compliance with NESHAP without elaboration is, in effect, an approval of the procedures used. This approval given by you, a representative of the state health department, entails a certain amount of legal responsibility. It is a matter of public trust. If the state public health officer approved of the procedures, then it must have been done properly and the building should be safe for future use. This is the second level of involvement in asbestos removal operations referred to earlier.

Currently, state employees are free of worry about law suits incurred in the performance of their duties due to the sovereign immunity concept in state law. This may not be true in a few decades when asbestos related diseases could be expected to turn up and legal action initiated.

To get the greatest public health benefit for the least cost in terms of time and money, the following policy has been implemented by the NESHAP manager. When a new contractor operates in the state, the removal is inspected by the NESHAP manager. If Class C supplied air is available, the asbestos removal procedures are evaluated inside the work area. If adequate respiratory protection is not available, as much information as possible is gathered about the renovation.

After the walk-through or walk-around inspection, the supervisor at the job site is asked the questions on the checklist. Then, after returning to the office, a thorough inspection report is written and copies are sent to the contractor, architect, district, EPA and State OSHA program. OSHA will only conduct an inspection if there is a complaint or there are grounds for suspecting violations.

Contractors who do work which adequately protects the health of their employees and future users of the building are placed on a list. Architects, school boards and sometimes industries frequently call requesting information about asbestos removal. The NESHAP manager sends an information package consisting of the NESHAP and OSHA regulations, suggested procedures for removing asbestos and the list of approved contractors. Inclusion on this list means a better chance for contractors to be awarded jobs. Therefore, there is an economic incentive for contractors to do good work. The inspection reports, checklists and advice of the NESHAP manager are also available to architects, etc., on request. School boards in South Carolina are rapidly learning that the low bidder does not necessarily give the best return for their money in the asbestos removal business.

The initial inspection, detailed inspection report, development and maintenance of the contractors list and consultation with architects, etc. are primarily the responsibility of the NESHAP manager. The district air staff should perform occasional follow-up inspections on an as-needed basis. Contractors who do marginal work should be inspected much more frequently than conscientious contractors. More than 1 inspection per job is rarely necessary unless the contractor has violated NESHAP. A contractor who does excellent work does not need to be inspected at every job.

7.2107 → It is not necessary for district air staff to write inspection reports about asbestos removal operations in as much detail as the NESHAP manager. Going over the checklist with the job site supervisor and sending a copy to the NESHAP manager along with a brief I/I describing the type of work done (demolition or renovation), procedures used to control asbestos emissions and general comments will be adequate.

As was mentioned earlier, the district air staff should also ensure that the contractor and landfill workers do not cause violations of NESHAP at the landfill. Until it has been confirmed visually that the asbestos is actually buried within 24 hours of deposition, the district air man or solid waste consultant should visit the landfill. A typed memorandum or I/I should state whether or not the asbestos was properly disposed of. After both the contractor and landfill workers have had experience in the proper disposal of asbestos, landfill inspections of every job will not be necessary.

* Briefly then, the responsibilities of the district air staff are to conduct follow-up inspections, go over the checklist with the job site supervisor, write a brief I/I and make sure that the asbestos is disposed of properly at the landfill.

These are general guidelines. Usually the NESHAP manager writes a letter acknowledging receipt of the 10 day notification of intent to remove asbestos but occasionally it may be more expedient for that to be handled by the district air manager. That will present no problem as long as the NESHAP manager is kept informed. Also, it may not be possible for the NESHAP manager to perform the initial inspection on a contractor. Ideally, that would be best so that all of the contractors could be evaluated by the same standard. However, if a district air manager performs an initial inspection and completes the checklist, that is much better than no information at all.

✓ In summary, the NESHAP manager should perform initial inspections, write detailed inspection reports, consult with architects, etc. and evaluate contractors. District air staff should conduct follow-up inspections and ensure that the asbestos is disposed of properly. There is room for flexibility. The most important thing in keeping the program operating smoothly is the sharing of information. The NESHAP manager and the district air staff need to be kept informed of each others activities.

RJB:llt

The NESHAP Regulation

A summary in (more or less) plain English

Asbestos

Emissions Standard

Unless using control equipment, no asbestos mills or persons collecting, processing, packaging, transporting or disposing of asbestos or materials containing asbestos may discharge visible emissions into the outer air.

Instead of adhering to the above standard, sources may use baghouses to control asbestos emissions. If the materials are combustible, the operator may use a wet scrubber or another control method demonstrated to be equally effective. Scrubbers must be operated at 40 inches water gauge pressure.

Baghouses must be operated at a minimum pressure of 4 inches water gauge, as measured across the fabric.

The flow of air through baghouses, as determined by American Society for Testing and Materials method D737-69, must not exceed 30 cubic feet per minute, per square foot of woven fabric; or 35 ft³/minute/ft² of felted fabric.

Ore dryers may use slightly more permeable material, permitting air flow of 40 ft³ or 45 ft³ per square foot of woven or felted fabric respectively.

In addition to the emission standard, the rules relating to asbestos include many restrictions on operations and use of materials, as described in the following sections.

Roadway Surfacing

Use of asbestos tailings or asbestos-containing waste in road surfacing operations is prohibited except temporarily in areas where there are asbestos or waste to coat icy roads is also forbidden.

Wet-Applied Insulation

Wet-applied or molded insulating materials that would crumble when dry may not contain commercial asbestos.

Key Industries Affected

- Asbestos mills
- Roadway construction
- Building construction, demolition and renovation
- Manufacturers of cloth, cord wicks, tubing, tape, twine, rope, thread yarn, roving, lap, or other textile materials; cement products; fireproofing and insulating materials; friction products; paper, millboard and felt; floor tile; paints, coatings, caulks, adhesives, sealants, plastics and rubber materials; chlorine; shotgun shells; and asphalt concrete; when such products contain asbestos.
- Operations that primarily install asbestos friction materials on motor vehicles are exempt from the non-visible emissions standard.

Applicability

At least some requirements included in this regulation apply to all operations (that process, use, or handle commercial asbestos, friable asbestos material, asbestos tailings, or particulate asbestos material, each of which is defined below.

● Asbestos means actinolite, amosite, anthophyllite, chrysotile, crocidolite, or tremolite.

● Particulate asbestos material means finely divided particles of asbestos material.

● Asbestos tailings include any solid waste product of asbestos mining or milling operations that contains asbestos.

● Commercial asbestos means any variety of asbestos produced by extracting asbestos from asbestos ore.

● Friable asbestos material includes any material that contains more than 1 percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder by hand pressure.

Demolition and Renovation

Companies that tear down and/or renovate buildings containing loose asbestos-coated materials must take many precautions against polluting the ambient air. Structures covered by this regulation are:

- Commercial, industrial, and institutional plants.
- Apartment buildings with more than four dwelling units.

Operations involving small amounts of asbestos may be exempted from most requirements under this regulation but nevertheless must notify air pollution control authorities of any asbestos demolition at all. The exemption applies to pipes containing friable asbestos materials of less than 80 meters (260 feet), or other building materials such as ducts, boilers, tanks, reactors, turbines, furnaces, or structural members containing less than 15 square meters (160 sq. ft.) of friable asbestos material. These amounts must encompass the work done at one source or the work done over a period between 30 days and one year on one continuous project.

The notification requirement for exempted operations includes the following:

- Name and address of owner or operator.
- Address of the building to be demolished.
- Scheduled starting and completion dates of the demolition and/or renovation.
- The measured or estimated amount of friable asbestos materials present at the demolition site and an account of how the estimate is made.

Persons without the exemption must submit name, address, and location of the property as described above plus the following:

- Description of the building or facility to be demolished or renovated, including the size, age, and prior use of the structure and the approximate amount of friable asbestos present.
- Nature of the planned demolition.
- Procedures to be used to control asbestos emissions.
- The name and address of the planned waste disposal site.
- Name, title, and authority of the governmental agent authorizing the demolition or renovation, if applicable.

When carrying out wrecking operations, firms should first remove asbestos materials before dismantling other portions of the building, particularly if the renovation would block access to the asbestos. Materials should be thoroughly wetted whenever exposed during demolition.

Asbestos-coated items may be carried from a building in one piece, but caution must be taken not to drop or mishandle them. Materials removed from areas more than 50 feet above ground must be lowered in dust-tight chutes or containers. Any material exposed during cutting or disjoining also must be wetted—unless emissions are controlled by a baghouse or scrubber.

Once removed from the structure, loose asbestos materials must remain wet until safely deposited in an approved waste site. This requirement is suspended, however, if temperatures fall below 0 C (32 F).

Asbestos Spraying
Materials containing more than 1 percent asbestos may not be sprayed on buildings, structures, structural members, pipes, or conduits. However, materials with greater asbestos content may be used for coating equipment and machinery, provided the operation is reported to appropriate authorities at least 20 days in advance. The following information is required:

- Name of owner or operator.
- Address of owner or operator.
- Location of spraying operation.

Procedures to be followed to meet emission standards.

Emissions from spraying operations may not be visible.

If asbestos fibers are enclosed with a binder ingredient during spraying and are not easily crumbled when dry, these regulations do not apply.

Asbestos Waste Disposal

Asbestos sources must comply with certain requirements when disposing of asbestos waste. Unless passed through a baghouse, emissions from waste material during collection, processing, packaging, incineration, transporting or disposition must be invisible.

All such material must be deposited at waste disposal sites.

Asbestos waste removed from control devices may be mixed with water and passed through a slurry. All wetted asbestos tailings must be sealed into lead-tight containers before being transported to an appropriate site. The containers must be labeled as specified by the Occupational Safety and Health Administration or as follows:

CAUTION

Contains Asbestos

Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous to Your Health

If not wetted, asbestos waste can be processed into nonfriable pellets and deposited at appropriate sites.

Asbestos waste from demolition or renovation operations need not be deposited at waste disposal sites unless it is friable.

Asbestos mills have additional rules for waste disposal. Like other sources, they must meet the zero opacity emissions standard or use appropriate asbestos filtering equipment. All asbestos materials must be kept thoroughly wet until disposed at an appropriate site. Wetting must be continuous except during periods when ambient temperature is below 15 degrees F. During periods

when the wetting operation is suspended, records must be kept of temperature measurements and retained for at least two years, during which they may be reviewed by air pollution authorities.

Asbestos Waste Disposal Sites

Active or inactive sites for disposal of asbestos waste must comply with the following requirements:

- Visible emissions to the outside air are prohibited during the collection, processing, packaging, transporting or disposition of asbestos-containing waste material.

- Warning signs must be displayed at all entrances and along the perimeter of those sections of the site where asbestos-containing waste material is deposited, at intervals of 330 feet. Signs should be legible, upright, 20" x 14" in size, and contain the following warning:

ASBESTOS WASTE DISPOSAL SITE

Do Not Create Dust

Breathing Asbestos

Is Hazardous to Your Health

- The perimeter of the disposal site must be fenced unless there is a natural barrier to admittance.

Rather than achieving the zero opacity emission standard, the operator of a disposal facility may cover the waste material with a petroleum-based dust suppression agent or six inches of compacted non-asbestos-containing material. This procedure should be followed at the close of each operating day or at least once every 24 hours.

Once a site becomes inactive, the fencing and posting requirements remain in effect. Vegetation may be planted over a six-inch soil base in order to hold down erosion. Alternatively, the waste can be covered by two feet of soil or with a firm layer of dust suppressant. In any event, the site must be properly maintained.

Reporting Requirements

All owners or operators of facilities affected by this standard must report to air pollution authorities the following:

- A brief description of each process that generates asbestos waste.
- The average weight of asbestos material disposed of, measured in kg/day.
- A description of the emission control equipment used for each process.
- In the case of fabric filter devices, the pressure drop across the filter, the

type and density of fabric in the filter, and permeability of air flow through the filter.

Operators of waste disposal sites must report:

- A brief description of the asbestos waste requiring disposal and the methods of emissions control used through all stages of this process.
- A description of the waste disposal site, including its location and the name of the operator.

Procedures to be followed to meet emission standards.

Emissions from spraying operations may not be visible.

If asbestos fibers are enclosed with a binder ingredient during spraying, and are not easily crumbled when dry, these regulations do not apply.

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- The average weight of asbestos material disposed of, measured in kg/day.
- A description of the emission control equipment used for each process.
- In the case of fabric filter devices, the pressure drop across the filter, the

type and density of fabric in the filter, and permeability of air flow through the filter.

Operators of waste disposal sites must report:

- A brief description of the asbestos waste requiring disposal and the methods of emissions control used through all stages of this process.
- A description of the waste disposal site, including its location and the name of the operator.

Chapter 9: Specifications and Requirements for Contractors

Removal, encapsulation, and enclosure operations must be performed carefully. Poorly performed work can cause a greater exposure problem than it eliminates. Workers who do not remove asbestos material wet or who damage the material during encapsulation or enclosure cause uncontrolled release of asbestos fibers. If fiber release is not properly contained in the work area, workers will be exposed and widespread contamination of the building will occur.

EPA and OSHA have issued regulations which cover the removal, encapsulation, and enclosure of asbestos material. Contractors are required to comply with both regulations. EPA regulations require that removed asbestos material be properly contained and disposed of without release of asbestos fibers into the environment. OSHA regulations require worker protection to prevent exposure to hazardous levels of asbestos fibers.

It should not be assumed that all contractors will comply with these regulations. Some contractors may not know that compliance is required; others may ignore the regulations in order to save time or money.

The EPA and OSHA regulations do not require worker decontamination before leaving the job site and clean-up of the contaminated work area after the job has been completed. Therefore, school officials should not only require contractors to comply with the EPA and OSHA regulations but also require them to take additional measures to ensure proper work practices and protection of the building environment. Past experience has shown that in many cases without adequate supervision and instruction from supervisors or management, workers will remove asbestos dry instead of wet, work without respirators, eat or drink in the work area, and leave the job site in their contaminated worksuits and clothing.

For these reasons, there are a number of precautions that should be taken:

- (1) Become familiar with the EPA and OSHA regulations and any State and local government regulations that apply to asbestos material removal, encapsulation, and enclosure.
- (2) Require contractors submitting bids to explain in their bids how they intend to comply with the applicable regulations.
- (3) Include specifications for asbestos fiber containment, worker protection, and decontamination of the work area in contracts and enforce the requirements of the contract.

(4) NIOSH recommends that contractors who submit bids provide evidence that they and their workers have attended training courses dealing with occupational safety and the health hazards associated with asbestos material removal, encapsulation, and enclosure. Information on contractor training materials is available from the OSHA and NIOSH Regional Offices listed in Appendices D and E.

(5) For any corrective action, notify the nearest OSHA office listed in Appendix D when work will begin and let the contractor know that OSHA will be notified.

(6) For removal, notify the appropriate EPA NESHAPS Coordinator listed in Appendix B before the removal operation is begun.

(7) Recommend that the contractor contact the EPA Regional Asbestos Coordinator for technical assistance.

The task of finding a qualified contractor may be complicated by various political and economic pressures. There may be pressure by people who are unaware of the hazards of poorly performed work to take action as soon as possible and as cheaply as possible. Strict compliance with the EPA and OSHA regulations and the recommended specifications takes time and money. Contractors offering the lowest bid may not be knowledgeable or capable of complying with these regulations.

Short summaries of the EPA and OSHA asbestos regulations follow. The full texts of these regulations are printed in Appendices A and C. Recommended specifications for removal, encapsulation, and enclosure contracts are also included in this chapter. These specifications can be used to guide school officials in negotiating contracts which will ensure proper work practices and a protected building environment.

EPA Regulations

EPA regulates the removal and disposal of asbestos materials from ceilings, walls, pipes, and other surfaces in buildings. The regulations were issued under the EPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS). Written notification to the NESHAPS Coordinator is required before asbestos material can be removed.

The regulations require wetting of the asbestos material before, during, and after stripping to prevent dust emissions. The regulations use "stripping" to refer

to taking asbestos off the ceilings, walls, pipes, etc.; and "removal" to refer to taking stripped asbestos material out of the building for disposal. If material cannot be removed wet because of freezing temperatures or damage to equipment by water, the EPA NESHAPS Coordinator should be notified. In some cases dry removal of asbestos material requires written permission from EPA.

Stripped asbestos material must be placed in leak-tight containers while still wet before removal from the building. Containers of asbestos material may not be dropped out of windows or down from one floor to the next. Asbestos material must be transported within the building in containers or dust-tight chutes.

Containers must be marked with a warning label (use the OSHA label on page and be buried in a waste disposal site meeting the requirements of Section 61.25 of the EPA regulations. In most cases a State-approved sanitary landfill will be an acceptable disposal site.

Before contractors begin any asbestos removal operation, they must send a written notification to the EPA NESHAPS Coordinator before starting the removal operation. The notification must contain the following information:

- (1) Name and address of the contractor.
- (2) Address and description of the building, including size, age, and prior use of the building and amount of friable asbestos material present (square feet).
- (3) Scheduled starting and completion dates for removal.
- (4) Procedures that will be employed to comply with the regulation.
- (5) The name and address of the waste disposal site where the asbestos waste will be deposited.

When contractors send in notification of an asbestos removal operation to EPA, the EPA NESHAPS Coordinator will notify the OSHA office for that area that a removal operation is planned.

See Appendix A for the full text of the EPA asbestos regulations. Questions about the regulations and compliance problems can be answered by the NESHAPS Coordinator listed in Appendix B.

OSHA Regulations

OSHA regulates workplace practices and the airborne concentration levels to which asbestos workers can be exposed. The OSHA regulations apply to removal, encapsulation, and enclosure operations involving asbestos materials.

OSHA has established limits on the amount of airborne asbestos to which a worker may be exposed on a daily basis. Over an 8-hour period the average airborne asbestos concentration level (also known as the time weighted average (twa)) to which a worker may be exposed may not exceed two fibers longer than five micrometers per cubic centimeter of air (2f/cc). At

no time during the 8-hour period may the airborne concentration exceed 10 fibers longer than 5 micrometers per cubic centimeter of air (10f/cc). The 10f/cc concentration is called the ceiling concentration. NIOSH has recommended lowering the 8-hour twa to 0.1 fibers per cubic centimeter (0.1f/cc).

Contractors must use air monitoring to determine whether the airborne concentration of asbestos exceeds these exposure limits. The regulations prescribe the method to be used for air monitoring and where and how often air samples must be taken.

If the airborne concentration does exceed the specified exposure limits (either the 8-hour twa or the ceiling concentration), then the contractor performing removal, encapsulation, or enclosure must:

(1) Provide employees with approved respirators. The OSHA regulations require different types of respirator under different conditions. The OSHA Regional Office listed in Appendix D can provide information on respirator requirements. The NIOSH Regional Offices listed in Appendix E can provide information on approved respirators.

(2) Provide change rooms and two separate lockers or storage containers so that employees can keep street clothes and work clothes separate. In addition, if the ceiling concentration is exceeded, the contractor must provide his employees with protective clothing.

The regulations require contractors to place caution signs inside and immediately outside of the work area. The signs must advise people entering the area of the hazards of exposure to asbestos.

Containers of waste asbestos material must be marked with a warning label which states:

**CAUTION
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
BREATHING ASBESTOS DUST MAY CAUSE
SERIOUS BODILY HARM**

See Appendix C for the full text of the OSHA asbestos regulations. Questions about the regulations and compliance problems can be answered by the OSHA Regional Offices listed in Appendix D. Information on contractor training and occupational safety is also available from these OSHA offices and the NIOSH Regional Offices listed in Appendix E.

Contract Specifications

The following general specifications are recommended for removal and encapsulation contracts. Some of these specifications are also appropriate for enclosure contracts. If these recommended specifications are incorporated into contracts and strictly enforced, the building environment will be protected against contamination.

Contractors should be encouraged to receive training and to train their workers in safe work practices and in proper removal, encapsulation, and enclosure methods. Contractor and worker training can be required in the contract.

1. Regulations

Contractors shall comply with the requirements of the EPA regulations, National Emission Standards for Asbestos, and the OSHA regulations on asbestos, Section 1910.1001 [and any applicable State and local government regulations] which are incorporated by reference.

2. Scope of Work

A. The Contractor shall furnish all labor, materials, services, insurance, and equipment necessary to carry out the [removal operation, encapsulation operation] in accordance with the EPA and OSHA regulations [and any applicable State and local government regulations].

B. The Contractor shall be responsible for obtaining approval for a waste disposal site in compliance with Section 61.25 of the EPA regulations.

C. Contractors shall post the EPA and OSHA regulations [and any applicable State and local government regulations] at the job site.

3. Worker Protection

A. The Contractor shall provide workers with approved respirators. The Contractor shall provide a sufficient quantity of filters approved for asbestos so that workers can change filters during the work day. Filters shall not be used any longer than one (1) work day. The respirator filters shall be stored at the job site in the change room and shall be totally protected from exposure to asbestos prior to their use.

B. Workers shall always wear a respirator properly fitted on the face in the work area.

C. Contractors shall instruct and train workers in proper respirator use.

D. Workers shall wear disposable, full-body coveralls and disposable head covers and footwear in the work area. Footwear may be disposable. Non-disposable footwear shall be left in the work area at all times until disposal at job completion.

E. The Contractor shall set up a change room and a shower outside of the work area.

F. All workers without exception shall:

(1) Remove street clothes in the change room and put on the disposable coveralls and head covers, and respirator before entering the work area.

(2) Remove the disposable coveralls, head covers, and footwear in the work area before leaving the work area. Still wearing their respirators, proceed to the showers and remove their respirators while showering with soap and water.

(3) Shower at the end of each day's work before entering the change room to change into street clothes.

G. Workers shall not eat, drink, smoke, chew gum, or chew tobacco in the work area. To eat, drink, or smoke, workers shall remove the disposable work clothes and footwear in the work area before leaving the work area. Still wearing their respirators, workers shall proceed to the showers and remove their respirators while showering with soap and water. Workmen shall then dress into a new, clean disposable coverall to eat, smoke, or drink. The new coverall can be worn to reenter the work area.

H. The Contractor shall provide a respirator and disposable coveralls, headcover, and footwear to any official representative of the school who inspects the job site.

I. All persons entering the work area shall wear an approved respirator and disposable coveralls, head cover, and footwear.



4. Work Area Preparation

A. The Contractor shall set up a decontamination facility outside of the work area which will consist of a change room, shower area, and equipment area. The decontamination facility shall be subject to the approval of the official representative of the school.

B. The Contractor shall isolate the work area for the duration of the work by completely sealing off all openings and fixtures in the work area including, but not limited to, heating and ventilation ducts, doorways, corridors, windows, skylights, and lighting with plastic sheeting taped securely in place.

C. The Contractor shall build double barriers of plastic sheeting at all entrances and exits to the work area so that the work area is always closed off by one barrier when workers enter or exit.

D. All floor and wall surfaces in the work area shall be covered with plastic sheeting taped securely in place to protect from water damage [or damage by sealants].

E. Before the work is begun, the Contractor shall wet clean all removable items and equipment not located on the asbestos material, remove them from the work area, and then return these items and equipment to the work area after the job has been completed and the area has been decontaminated.

F. The Contractor shall cover all non-removable items and equipment in the work area with plastic sheeting taped securely in place.

G. After work area isolation, the Contractor shall take out all detachable electrical, heating, ventilation equipment, and other items located on the asbestos material, clean them before covering with plastic sheeting taped securely in place, and return them to their proper place after the job has been completed and the work area has been decontaminated.

H. The Contractor shall remove all heating, ventilation, and air conditioning system filters, pack them in sealable plastic bags (6-mil minimum) for burial in the approved waste disposal site and replace them with new filters.

I. The contractor shall establish emergency and fire exits from the work area. Emergency procedures shall have priority.

5. Method of Removal

A. The asbestos material shall be sprayed with water containing a wetting agent to enhance penetration. The wetting agent shall be 50% polyoxyethylene ester and 50% polyoxyethylene ether (Aqua-GRO*), or the equivalent, in a concentration of one (1) ounce in five (5) gallons of water. A fine spray of the amended water

shall be applied to reduce fiber release preceding the removal of the asbestos material. The material shall be sufficiently saturated to prevent emission of airborne fibers in excess of the exposure limits prescribed in the OSHA regulations referenced in these specifications.

B. The asbestos material shall be removed in small sections by two-man teams on staging platforms. Before beginning the next section, the material shall be packed while still wet into sealable plastic bags (6-mil minimum) and placed into fiber or metal drums or skips for transport. Bags, drums, and skips shall be marked with the OSHA label prescribed by the OSHA regulations referenced in these specifications. The outside of all containers shall be clean before leaving the work area.

C. All plastic sheeting, tape, cleaning material, clothing, and all other disposable material or items used in the work area shall be packed into sealable plastic bags (6-mil minimum) and placed into metal or fiber drums or skips for transport. The drums and skips shall be marked with the OSHA label prescribed by the OSHA regulations referenced in these specifications.

D. The Contractor shall transport the sealed drums or skips to the approved waste disposal site. The sealed plastic bags may be dumped from the drums into the burial site unless the bags have been broken or damaged. The damaged bags shall be left in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled.

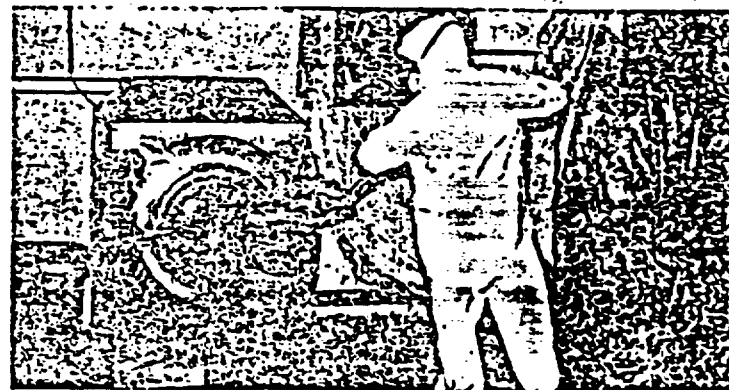
6. Decontamination of Work Area

A. The Contractor shall clean all surfaces in the work area with water and/or with a High Efficiency Particulate Absolute (HEPA) filtered vacuum. (A HEPA vacuum will fail if used on wet material.) After cleaning the work area, the Contractor shall wait 24 hours to allow for settlement of dust, and then wet-clean all surfaces in the work area again. After completion of the second cleaning operation, the Contractor shall perform a complete visual inspection of the work area to ensure that the work area is dust free. The Contractor shall take two air samples within 48 hours after completion of all cleaning work. (Minimum volume of air sample is 240 L).

B. If the official representative of the school finds that the work area has not been decontaminated, the Contractor shall repeat the cleaning and air monitoring until the work area is in compliance.

C. After the work area is found to be in compliance, all entrances and exits are unsealed and the plastic sheeting, tape, and any other trash and debris is disposed of in sealable plastic bags (6-mil minimum) and buried in the approved waste disposal site.

* Mention of trade names or specific products does not constitute endorsement by EPA.



7. Air Monitoring

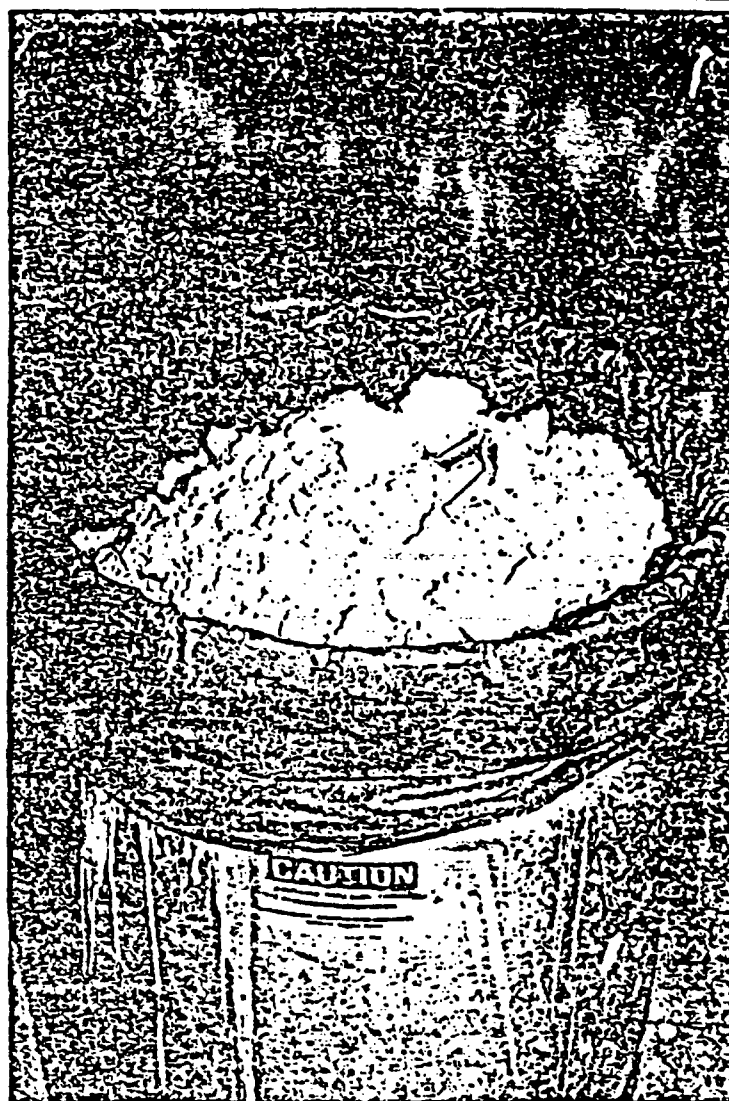
A. Throughout the entire [removal, encapsulation] and cleaning operations, air monitoring shall be conducted to ensure that the Contractor is complying with the EPA and OSHA regulations [and any applicable State and local government regulations]. The school shall provide an air monitoring technician to take air samples at the job site at no cost to the Contractor.

B. Air monitoring will be conducted according to the method prescribed by Section 1910.1001(f) of the OSHA regulations.

C. Air monitoring shall be performed to provide the following samples during the period of asbestos [removal, encapsulation]:

<i>Areas to be Sampled</i>	<i>Minimum Number of Samples for Each Work Day</i>	<i>Each Sample Minimum Volume Litres</i>
Work Area	2	120 L
Outside Work Area	1	120 L
Outside Building	1	240 L

D. Samples should only be taken after actual [removal, encapsulation] work has proceeded.



Removed Material in Drum With Plastic Liner

APPENDIX F

SUGGESTED SPECIFICATIONS FOR ASBESTOS REMOVAL

The following are suggested specifications which should be presented to a prospective contractor to determine whether a renovation or asbestos removal job can be accomplished in a safe and satisfactory manner.

1. Documentation of Performance in Asbestos Removal

- a. The contractor shall furnish documentation of successful performance in asbestos removal. This will include name and address of purchaser of service, location of work performed, and a record or air monitoring for asbestos as required by OSHA 1910.1001.
- b. The contractor will have at all times in his possession at his office (one copy) and in view at the job site (one copy), OSHA regulation 1910.1001, Asbestos, and Environmental Protection Agency 40 CFR Part 61, subpart B: National Emission standard for asbestos, asbestos stripping work practices, and disposal of asbestos waste.

2. Scope of Work

- a. The contractor shall furnish all labor, materials, services, insurance and equipment necessary for the complete removal of all asbestos located at the site in accordance with the

guidelines or regulations of the responsible state agency, EPA and OSHA.

- b. The contractor shall furnish proof that employees have had instruction on the dangers of asbestos exposure, on respirator use, decontamination, and OSHA regulations.

3. Worker's Dress and Equipment for Asbestos Removal

- a. Work clothes will consist of full body coveralls, disposable head covers, boots, or sneakers, and respiratory protective equipment as required by OSHA regulations. Eye protection and hard hats should be available as appropriate.
- b. Coveralls should be of a paper disposable type.
- c. Respiratory protection for workers shall be provided by the contractor as required by current OSHA regulation.

3. Decontamination

All workers, without exception:

- a. Will change work clothes at designated areas prior to start of day's work. Lockers or acceptable substitutes will be provided by the contractor for street and work clothes.
- b. All work clothes will be removed in the work area prior to departure from this area. Workers would then proceed to showers. Workers will shower before lunch and at the end of each day's work. Hot water, towels, soap, and hygienic conditions are the responsibility of the contractor.

3. No smoking, eating or drinking is to take place once beyond the clean room at the job site. Prior to smoking, eating or drinking, workers will fully decontaminate by showering. Each worker will then dress into a new clean disposable coverall to eat, smoke or drink. This new coverall can then be used to reenter the work area.
4. Work footwear will remain inside work area until completion of the job.
5. Pre-Asbestos Removal Preparation
 - a. The contractor will thoroughly seal all openings and fixtures including, but not limited to, heating and ventilating ducts, sky lights, doors, windows, and lighting with polyethylene taped securely in place.
 - b. Polyethylene sheets (6 mil minimum) will be used to cover the entire floor and wall surfaces.
 - c. The contractor will set up a decontamination facility in a predesignated area which will house the changing room, shower area, and equipment area.
 - d. Adequate toilet facilities should exist in the work area to avoid decontamination for this purpose. Where such facilities do not exist, the contractor will provide portable service.
 - e. Procedures will be written for evacuation of injured workers. Aid for a seriously injured worker will not be delayed for reasons of decontamination.

6. Methods of Asbestos Removal

- a. The asbestos material will be sprayed with water containing an additive to enhance penetration. The additive, or wetting agent, will be 50 percent polyethylene ester and 50 percent polyoxyethylene ether at a concentration of 1 ounce per 5 gallons of water. A fine spray of this solution must be applied to prevent fiber disturbance preceding the removal of the asbestos material. The asbestos will be sufficiently saturated to prevent emission of airborne fibers in excess of the exposure limits prescribed in the OSHA standards referenced in these specifications.
- b. Removal of the asbestos material will be done in small sections with two-person teams, on staging platforms, if needed. The material will be packed into labeled 6-mil plastic bags held within 55-gal drums prior to starting the next section to prevent the material from drying.
- c. Packed and sealed drums, with the required labeling, will be delivered to a predesignated disposal site for burial. Labels and all necessary signs shall be in accordance with EPA and OSHA standards.
- d. Following removal, the entire area will be wet cleaned. After a 24-hour period to allow for dust settling, the entire area will be wet cleaned again. During this settling period, no entry, activity, or ventilation will

be allowed. Twenty-four hours after the second cleaning all surfaces in the entire work area will be thoroughly vacuumed and wet mopped.

- e. All polyethylene material, tape, cleaning material, and clothing will be placed in plastic-lined drums, sealed and labeled as described above for the asbestos waste material.
- f. All equipment will be cleaned of asbestos material prior to leaving the work area.

7. Air Monitoring

- a. Throughout the removal and cleaning operations, air sample monitoring will be conducted to ensure that the Contractor is complying with all codes, regulations and ordinances. The method to be used is described in OSHA standards, 1910.93a. The air monitoring technician and his equipment will be subject to approval of the purchaser's representative. Prior to the start of any work, the technician's method of measurement and proof that his method is approved by the Secretary of Labor of the United States will be submitted to the purchasers representatives for his approval.
- b. Air monitoring will be performed to provide the following samples during the period of asbestos removal:

<u>Area to be sampled</u>	<u>Number of samples</u>	<u>Minimum sample volume in liters</u>
Work area	4	60
Outside work area barriers	2	120
Outside building	2	240

Samples will be taken after the actual removal operation has begun.

8. Clean-up and Guarantee

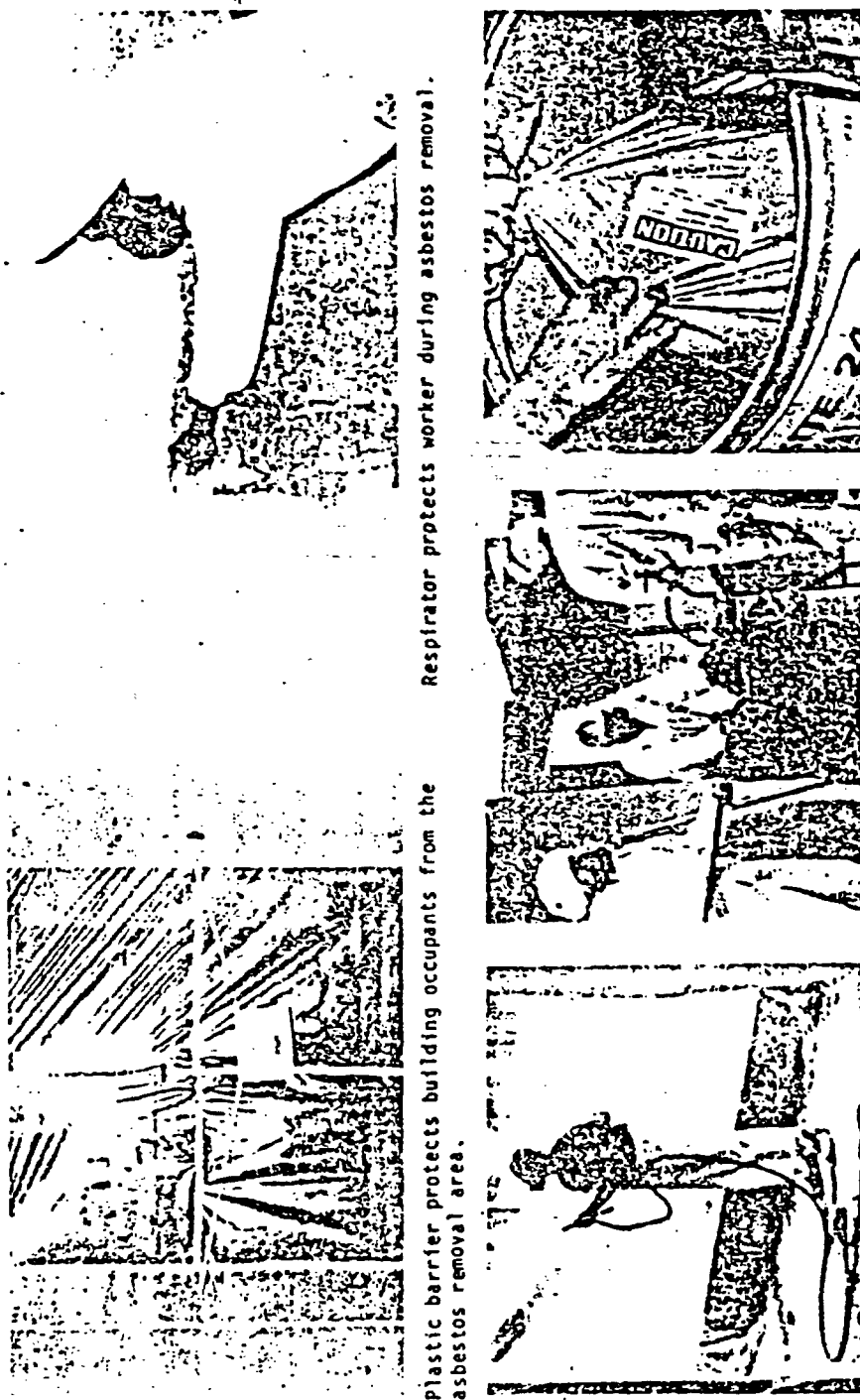
- a. After the second cleaning operation the following test should be performed: A complete visual inspection should be made to insure dust free conditions, and two air samples within 48 hours after completion of all cleaning work should be taken. (Minimum volume of air sample 240 liters).
- b. If noncompliance occurs, repeat cleaning and measurement until space is in compliance. Refer to 29 CFR 1910.1001, 7a.

9. Disposal of Asbestos Material and Related Debris

- a. All asbestos materials and miscellaneous debris in sealed drums will be transported to the predesignated disposal site in accordance with the guidelines of the U.S. Environmental Protection Agency.
- b. Workers unloading the sealed drums and machinery operators will wear respirators when handling material at the disposal site.

- c. The bags may be dumped from the drums into the burial site. The drums may be reused. However, if a bag is broken or damaged, the entire drum should be buried.
10. If, at any time, the purchaser's representative decides that work practice are violating pertinent regulations or endangering workers, he will immediately notify in writing the on-site contractor representative that operations will cease until corrective action is taken.

Figure F-1 shows the general sequence which should be followed in an asbestos removal operation.



Respirator protects worker during asbestos removal.

Plastic barrier protects building occupants from the asbestos removal area.

Sealed bags are transported to sanitary landfill for disposal.

Asbestos material being loaded in approved containers.

Ceiling asbestos wetted to decrease airborne fibers during removal process.

Figure F-1. Sequence of steps in an asbestos removal operation.

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SAMPLE SPECIFICATIONS

NOTE: This should not be used as a set of SPECIFICATIONS approved by DMHC. It is a sample which includes suggested requirements that probably should be included in the specifications. There may be other things, omitted here, that should have been included also.

Authorized Visitor - the building owner, or a representative of any regulatory or other agency having jurisdiction over the project. 760230

Abatement - procedures to control fiber release from spray- or trowel-applied asbestos-containing building materials. Includes encapsulation, enclosure, removal.

Removal - All herein specified procedures necessary to strip all spray- or trowel-applied asbestos-containing materials from the designated areas and to dispose of these materials at an acceptable site.

Encapsulation - All herein specified procedures necessary to coat all spray- or trowel-applied asbestos-containing materials with an encapsulant to control the possible release of asbestos fibers into the ambient air.

Enclosure - All herein specified procedures necessary to complete enclosure of all spray- or trowel-applied asbestos-containing material behind airtight, impermeable, permanent barriers.

Air Monitoring - the process of measuring the fiber content of a specific volume of air in a stated period of time.

HEPA Vacuum Equipment - high efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

Surfactant - a chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Amended water - a water to which a surfactant has been added.

Airlock - a system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 6 feet (2 meters) apart. *

Decontamination Enclosure System - a series of connected rooms, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment. A decontamination enclosure system always contains at least one airlock.

Worker Decontamination Enclosure System - a decontamination enclosure system for materials and equipment, typically consisting of a designated area of the work area, a washroom, a holding area, and an uncontaminated area.

* Two curtained doorways spaced a minimum of 6 feet (2 meters) apart from an airlock.

Equipment Decontamination Enclosure System - a decontamination enclosure system for materials and equipment, typically consisting of a designated area of the work area, a washroom, a holding area, and an uncontaminated area.

Clean Room - an uncontaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of worker's street clothes and protective equipment.

Shower Room - a room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

Equipment Room - a contaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.

Washroom - a room between the work area and the holding area in the equipment decontamination enclosure system. The washroom comprises an airlock.

Holding area - a chamber between the washroom and an uncontaminated area in the equipment decontamination enclosure system. The holding area comprises an airlock.

HEPA filter - a high efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.

Encapsulant (Sealant) - a liquid material which can be applied to asbestos-containing material and which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

Wet Cleaning - the process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as asbestos-contaminated waste.

Negative Pressure - a local exhaust system capable of maintaining a minimum pressure differential of minus 0.02 inch of water column relative to adjacent unsealed areas.

Materials & Equipment

1. Plastic sheeting of 6 mil thickness or as specified.
2. Tape capable of sealing joints of plastic and adhering under wet and dry conditions.
3. Surfactant (wetting agent) consisting of 50 percent polyoxyethylene ether and 50 percent polyo ethylene ester to mix with water [1 oz per 5 gallons water].
4. Impermeable containers - suitable to receive and retain any asbestos-containing or contaminated materials until disposal (6 mil thick bags and drums).
5. Warning labels and signs as per OSHA regulations.
6. Replacement, enclosure, or encapsulating material as specified by owner.

ASBESTOS REMOVAL

1. Spray asbestos material with amended water, using spray equipment capable of providing a "mist" application to reduce the release of fibers. Saturate the material sufficiently to wet it to the substrate without causing excess dripping or delamination of the material. Spray the asbestos material repeatedly during work process to maintain wet condition and to minimize asbestos fiber dispersion.
2. Remove the saturated asbestos material in small sections. As it is removed pack the material in sealable plastic bags of [6 mil] [0.15 mm.] minimum thickness and place in labeled containers for transport. Material shall not be allowed to dry out prior to insertion into the container.
3. Seal filled containers. [Place caution labels on containers in accordance with OSHA regulation 29 CFR 1910.1001 (g) (2).] Clean external surfaces of containers thoroughly by wet sponging in the designated area of the work area which is part of the equipment decontamination enclosure system. Move containers to washroom, wet clean each container thoroughly, and move to holding area pending removal to uncontaminated areas. Ensure that containers are removed from the holding area by workers who have entered from uncontaminated areas dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into the washroom or the work area; ensure that contaminated workers do not exit the work area through the equipment decontamination enclosure system.
4. After completion of stripping work, all surfaces from which asbestos has been removed shall be wire brushed and/or wet sponged or cleaned by an equivalent method to remove all visible material. During this work the surfaces being cleaned shall be kept wet.
5. Where the building owner decides removal of asbestos-containing material is impossible due to obstructions such as structural members or major service elements, and provides a written direction, encapsulate the material as follows:

[Apply bridging type encapsulant to provide [] mm. minimum dry film thickness over sprayed asbestos surfaces.] Apply penetrating type encapsulant to penetrate existing sprayed asbestos materials to a depth of [] mm.]. [Apply penetrating type encapsulant to penetrate existing sprayed asbestos materials uniformly to substrate.] [When using a bridging type encapsulant, use a different color for each coat. Use [] for final coat.] [During treatment with a penetrating encapsulant, remove selected random core samples of the asbestos-containing material in the presence of the owner to check the depth of penetration.] Apply encapsulant using airless spray equipment.

Air Monitoring for Asbestos

Sample the in-school ambient atmosphere prior to initiation of abatement procedure.

Comply with OSHA requirements for determining employee exposures as well as area and personal sampling required by the facility owner.

Sample the in-school ambient atmosphere after the second cleaning to determine degree of cleanness. (goal 0.01 fibers/w)

Sample after third cleaning (if necessary) to determine degree of cleanness. (goal 0.01 fiber/cc)

All air monitoring shall comply with the NIOSH approved method for asbestos samples. The analysis will be done according to the NIOSH analytical technique and by a laboratory certified by NIOSH for Asbestos Analysis. The contractor will be responsible for providing this service and must have prior approval for the laboratory from the architect and owner. Daily reports of sampling results may be required.

Site Preparation

1. Close down electric power systems and provide temporary power and lighting.
2. Shut down heating, cooling, and ventilation systems.
3. Pre-clean all movable objects within work area, using High Efficiency Particulate Air Absolute Filtration (HEPA) and/or wet cleaning methods and ship to temporary storage location.
4. Pre-clean fixed objects using HEPA vacuum equipment and/or wet cleaning techniques and enclose with minimum 4 mil plastic sheeting.
5. Clean the proposed work area using HEPA vacuum equipment and/or wet cleaning methods as appropriate.
6. Seal off all openings to the exterior with plastic sheeting sealed with tape. Doorways and corridors not used for passage during work must be sealed with barriers. 6 mil minimum.
7. Cover floor and wall surfaces with plastic sheeting sealed with tape. 6 mil minimum. (minimum of 2 layers on floor)
8. Construct airlocks at entrances and exists to work areas.
 - (a) An equipment room with two airlocks, one to work area and one to the shower room.
 - (b) A shower room with two airlocks, one to the equipment room and one to the clean room. The shower room shall contain at least one shower with hot and cold or warm water. A supply of soap shall be insured at all times.
 - (c) A clean room with one airlock into the shower and one exit to an uncontaminated area of the building.
 - (d) An equipment/waste decontamination washroom with two airlocks, one to the work area and one to the holding area.
 - (e) A holding area with one airlock to an uncontaminated area.
 - (f) Openings to other parts of the building not undergoing asbestos abatement and/or remaining in use shall be sealed off by means of an airtight barrier.
9. Clean and remove ceiling materials and/or equipment as required for asbestos abatement using wet methods or HEPA vacuum. Suspended ceiling tiles, T-grids, suspended grid systems, etc., may be either secured with 6 mil plastic sheeting for future use or discarded as contaminated waste.
10. Maintain and visually inspect all enclosures at the beginning of each work day. Repair all damaged areas immediately.
11. Install HEPA ventilation system to maintain negative pressure within area to be cleaned. No discharge of asbestos fibers to the outside of the building will be allowed.

1. Repair damaged and missing areas of existing sprayed asbestos to obtain a suitable base for sealing and to restore continuity of existing material. Use the specified asbestos-free replacement material. Prepare surfaces and apply replacement material in accordance with manufacturer's recommendations.
2. Remove loose or hanging asbestos material and pack in sealable plastic bags [6 mil] [0.15 mm] minimum thickness and place in labeled containers for transport.
3. Seal filled containers. [Place caution labels on containers in accordance with OSHA regulation 29 CFR 1910.1001 (g) (2).] Clean external surfaces of containers thoroughly by wet sponging in the designated area of the work area which is part of the equipment decontamination enclosure system. Move containers to washroom, wet clean each container thoroughly, and move to holding area pending removal to uncontaminated areas. Ensure that containers are removed from the holding area by workers who have entered from uncontaminated areas dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into the washroom or the work area; ensure that contaminated workers do not exit the work area through the equipment decontamination enclosure system.
4. [Apply bridging type encapsulant to provide [] mm minimum dry film thickness over sprayed asbestos surfaces.] [Apply penetrating type encapsulant to penetrate existing sprayed asbestos materials uniformly to substrate, or to the depth of [] penetration as previously determined by field spray test. [When using a bridging type encapsulant, use a different color for each coat. Use [] for final coat.] [During treatment with a penetrating encapsulant, remove selected random core samples of the asbestos-containing material in the presence of the owner to check the depth of penetration.] Apply encapsulant using airless spray equipment.

ASBESTOS ENCLOSURE

1. Spray areas which will be disturbed while securing hangers and other fixing devices with water containing the specified wetting agent. Keep asbestos material damp to prevent release of airborne fibers.
2. Remove loose or hanging asbestos material when damp, [and place in sealable plastic bags of 6 mil [0.15] minimum thickness] and place in labeled containers for transport.
3. Seal filled containers. Place caution labels on containers in accordance with OSHA regulation 29 CFR 1910.1001 (g) (2). Clean external surfaces of containers thoroughly by wet sponging in the designated area of the work area which is part of the equipment decontamination enclosure system. Move containers to washroom, wet clean each container thoroughly, and move to

holding area pending removal to uncontaminated areas. Ensure that containers are removed from the holding area by workers who have entered from uncontaminated areas dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into the washroom or the work areas; ensure that contaminated workers do not exit the work area through the equipment decontamination enclosure system.

4. After installation of hangers and other fixing devices and before enclosing asbestos, repair damaged and missing areas of existing sprayed-on materials using the specified asbestos free replacement material. Prepare surfaces and apply in accordance with manufacturer's recommendations.
5. There are so many ways to enclose asbestos surfaces that it is impossible to include a useful specification here. Follow owner's specifications.

CLEAN UP

1. Remove visible accumulations of asbestos material and debris. Wet clean all surfaces within the work area.
2. Remove the plastic sheets from walls and floors only. The windows, doors, and HVAC vents shall remain sealed and any HEPA filtered negative air pressure systems, air filtration and decontamination enclosure systems shall remain in service.
3. Clean all surfaces in the work area and any other contaminated areas with water and or with HEPA filtered vacuum equipment. After cleaning the work area, wait 24 hours to allow for settlement of dust, and again wet clean or clean with HEPA filtered vacuum equipment all surfaces in the work area. After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that the work area is free of visible asbestos debris. Air samples will be taken to measure degree of cleanness.
4. Sealed drums and all equipment used in the work area shall be included in the cleanup and shall be removed from work areas, via the equipment decontamination enclosure system, at an appropriate time in the cleaning sequence.
5. If the building owner within [24] hours finds visible accumulations of asbestos debris in the work area, the Contractor shall repeat the wet cleaning until the work area is in compliance, at the Contractor's expense. Sample again to determine cleanness.
6. When a final inspection determines that the area is free of accumulations of visible asbestos debris, the decontamination enclosure systems shall be removed, the area thoroughly wet cleaned, and materials from the equipment room and shower

disposed of as contaminated waste. A final check shall be carried out to ensure that no dust or debris remains on surfaces as a result of dismantling operations.

7. As the work progresses, to prevent exceeding available storage capacity on site, remove sealed and labeled containers of contaminated waste and dispose of as contaminated waste.

RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

1. When clean-up is complete:

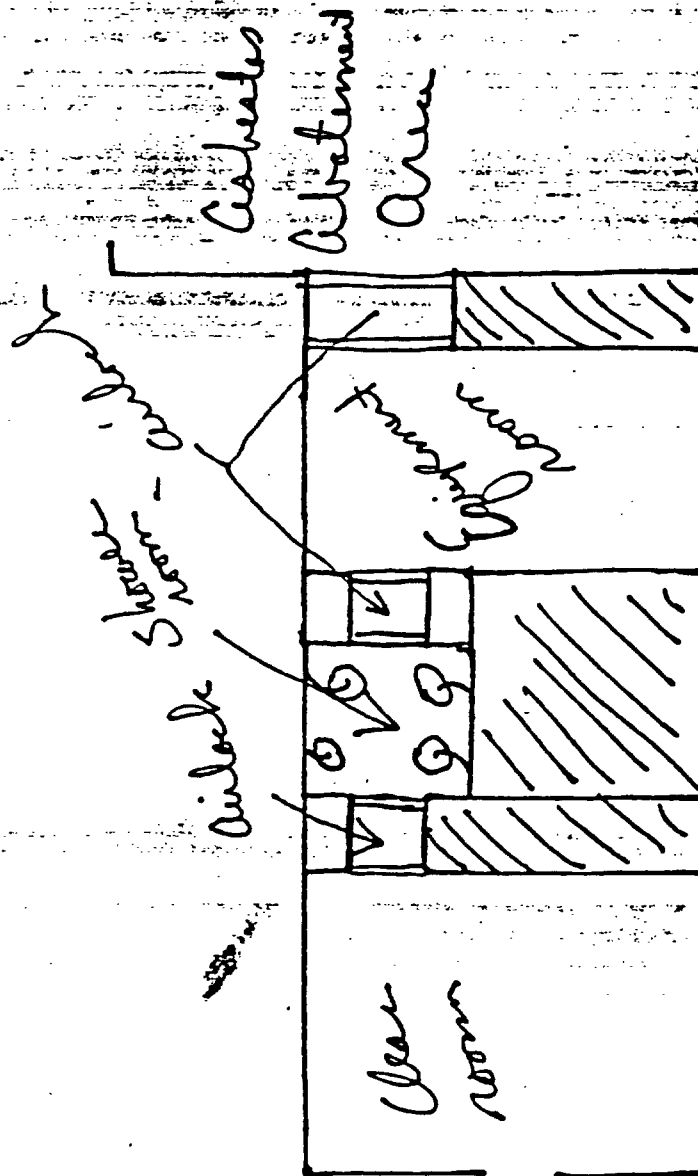
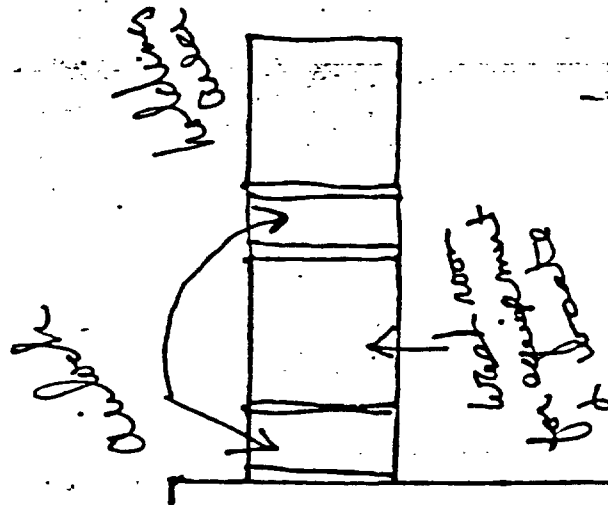
- (a) Relocate objects moved to temporary locations in the course of the work to their former positions.
- (b) Re-secure mounted objects removed in the course of the work in their former positions.
- (c) Re-establish HVAC, mechanical and electrical systems in proper working order. Install new filters and dispose of used filters as contaminated waste.

DISPOSAL

Disposal of asbestos-containing materials and asbestos-contaminated waste. As the work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labeled containers of asbestos waste and dispose of such containers at an authorized disposal site in accordance with the requirements of disposal authority. Submit documentation regarding disposal to building owner.

ADDITIONAL REQUIREMENTS WHICH SHOULD BE INCLUDED IN SPECS

- 1.) workers should be provided with type C air.
- 2.) contractor should agree to make respiratory medical examinations a condition of employment. should also agree to keep medical and air sampling records.
- 3.) contractor should be required to make arrangements with the landfill operator to:
 - (a) have the asbestos buried within 24 hours of arrival at the landfill.
 - (b) deliver the asbestos at times when it can be buried within 24 hrs.
 - (c) get receipts of some sort from the landfill. Require that all asbestos be accounted for. Financial penalties should be included for noncompliance.
- 4.) for the job to be considered complete, before payment will be authorized, air sampling should show that the renovated area is clean. Air levels should be less than .01 fibers/cc with at least 1000 Liters sampled.



Coheated
Airbrated
Area

Appendix C: U.S. Department of Labor- Occupational Safety and Health Administration (OSHA) Asbestos Regulations

Code of Federal Regulations Title 29, Part 1910)

Section 1910.1001

a) Definitions.

For the purpose of this section.

(1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

b) Permissible exposure to airborne concentrations of asbestos fibers.

(1) Standard effective July 7, 1972. The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) Standard effective July 1, 1976. The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) Ceiling concentration. No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

c) Methods of compliance.

(1) Engineering methods.

(i) Engineering controls. Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) Local exhaust ventilation.

(a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2-1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2-1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) Particular tools. All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) Work practices.

(i) Wet methods. Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) Particular products and operations. No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) Spraying, demolition, or removal. Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

J) Personal protective equipment.

(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) Air purifying respirators. A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne

concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) Powered air purifying respirators. A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) Type "C" supplied-air respirators, continuous flow or pressure-demand class. A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) Establishment of a respirator program.

(a) The employer shall establish a respirator program in accordance with the requirements of the American National Standard Practices for Respiratory Protection, ANSI Z88.2-1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2-1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the

same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms:

(i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering:

DON'T

(a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

Method of measurement.

All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400-450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) Monitoring.

(1) Initial determinations. Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) Personal monitoring.

(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) Environmental monitoring.

(i) Samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees

whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

4) **Employee observation of monitoring.** Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

) Caution signs and labels.

1) Caution signs.

(i) **Posting.** Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) **Sign specifications.** The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

<i>Legend</i>	<i>Notation</i>
Asbestos -----	1" Sans Serif, Gothic or Block.
Dust Hazard -----	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust -----	¾" Gothic.
Wear Assigned Protective Equipment.	¾" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¾" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) Caution labels.

(i) **Labeling.** Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) **Label specifications.** The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers
Avoid Creating Dust

Breathing Asbestos Dust May Cause
Serious Bodily Harm

(h) Housekeeping.

(1) **Cleaning.** All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) **Waste disposal.** Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) Recordkeeping.

(1) **Exposure records.** Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 20 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) **Employee access.** Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) **Employee notification.** Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

i) Medical examinations.

(1) **General.** The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

(2) **Preplacement.** The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV_{1.0}).

(3) **Annual examinations.** On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity

(FVC) and forced expiratory volume at 1 second (FEV_{1.0}).

(4) **Termination of employment.** The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV_{1.0}).

(5) **Recent examinations.** No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) Medical records.

(i) **Maintenance.** Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) **Access.** The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

Subpart B—National Emission Standard for Asbestos

§ 61.20 Applicability.

The provisions of this subpart are applicable to those sources specified in § 61.22.

§ 61.21 Definitions.

Terms used in this subpart are defined in the act, in subpart A of this part, or in this section as follows:

(a) "Asbestos" means actinolite, amosite, anthophyllite, chrysotile, crocidolite, tremolite.

(b) "Asbestos material" means asbestos or any material containing asbestos.

(c) "Particulate asbestos material" means finely divided particles of asbestos material.

(d) "Asbestos tailings" means any solid waste product of asbestos mining or milling operations which contains asbestos.

(e) "Outside air" means the air outside buildings and structures.

(f) "Visible emissions" means any emissions which are visually detectable without the aid of instruments and which contain particulate asbestos material.

(g) "Asbestos mill" means any facility engaged in the conversion or any intermediate step in the conversion of asbestos ore into commercial asbestos. Outside storage of asbestos materials is not considered a part of such facility.²

(h) "Commercial asbestos" means any variety of asbestos which is produced by extracting asbestos from asbestos ore.²

(i) "Manufacturing" means the combining of commercial asbestos, or in the case of woven friction products the combining of textiles containing commercial asbestos, with any other material(s), including commercial asbestos, and the processing of this combination into a product as specified in § 61.22(c).²

(j) "Demolition" means the wrecking or taking out of any load-supporting structural member and any related removing or stripping of friable asbestos materials.^{2,7}

(k) "Friable asbestos material" means any material that contains more than 1 percent asbestos by weight and that can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure.⁷

(l) "Control device asbestos waste" means any asbestos-containing waste material that is collected in a pollution control device.⁷

(m) "Renovation" means the removing or stripping of friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member. Operations in which load-supporting structural members are wrecked or taken out are excluded.^{7,49}

(n) "Planned renovation" means a renovation operation, or a number of such operations, in which the amount of friable asbestos material that will be removed or stripped within a given period of time can be predicted. Operations

that are individually non-scheduled are included, provided a number of such operations can be predicted to occur during a given period of time based on operating experience.⁷

(o) "Emergency renovation" means a renovation operation that results from a sudden, unexpected event, and is not a planned renovation. Operations necessitated by non-routine failures of equipment are included.⁷

(p) "Adequately wetted" means sufficiently mixed or coated with water or an aqueous solution to prevent dust emissions.⁷

(q) "Removing" means taking out friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member from any building, structure, facility, or installation.^{7,49}

(r) "Stripping" means taking off friable asbestos materials from any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member.^{7,49}

(s) "Fabricating" means any processing of a manufactured product containing commercial asbestos, with the exception of processing at temporary sites for the construction or restoration of buildings, structures, facilities or installations.⁷

(t) "Inactive waste disposal site" means any disposal site or portion thereof where additional asbestos-containing waste material will not be deposited and where the surface is not disturbed by vehicular traffic.⁷

(u) "Active waste disposal site" means any disposal site other than an inactive site.⁷

(v) "Roadways" means surfaces on which motor vehicles travel including, but not limited to, highways, roads, streets, parking areas, and driveways.⁷

(w) "Asbestos-containing waste material" means any waste which contains commercial asbestos and is generated by a source subject to the provisions of this subpart, including asbestos mill tailings, control device asbestos waste, friable asbestos waste material, and bags or containers that previously contained commercial asbestos.⁷

(x) "Structural member" means any load-supporting member, such as beams and load-supporting walls; or any non-load-supporting member, such as ceilings and non-load-supporting walls.³⁶

§ 61.22 Emission standard.

(a) Asbestos mills: There shall be no visible emissions to the outside air from any asbestos mill except as provided in paragraph (f) of this section.²

(b) Roadways: The surfacing of roadways with asbestos tailings or with asbestos-containing waste that is generated by any source subject to paragraphs (c), (d), (e) or (h) of this section is prohibited, except for temporary roadways on an area of asbestos ore deposits. The deposition of asbestos tailings or asbestos-containing waste on roadways

covered with snow or ice is considered "surfacing."⁷

(c) Manufacturing: There shall be no visible emissions to the outside air, except as provided in paragraph (f) of this section, from any of the following operations if they use commercial asbestos or from any building or structure in which such operations are conducted.⁷

(1) The manufacture of cloth, cord, wicks, tubing, tape, twine, rope, thread, yarn, roving, lap, or other textile materials.

(2) The manufacture of cement products.

(3) The manufacture of fireproofing and insulating materials.

(4) The manufacture of friction products.

(5) The manufacture of paper, mill-board, and felt.

(6) The manufacture of floor tile.

(7) The manufacture of paints, coatings, caulks, adhesives, sealants.

(8) The manufacture of plastics and rubber materials.

(9) The manufacture of chlorine.

(10) The manufacture of shotgun shells.⁷

(11) The manufacture of asphalt concrete.⁷

(d) Demolition and renovation. The requirements of this paragraph shall apply to any owner or operator of a demolition or renovation operation who intends to demolish any institutional, commercial, or industrial building (including apartment buildings having more than four dwelling units), structure, facility, installation, or portion thereof which contains any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member that is covered or coated with friable asbestos materials, except as provided in paragraph (d)(1) of this section; or who intends to renovate any institutional, commercial, or industrial building, structure, facility, installation, or portion thereof where more than 80 meters (ca. 260 feet) of pipe covered or coated with friable asbestos materials are stripped or removed, or more than 15 square meters, (ca. 160 square feet) of friable asbestos materials used to cover or coat any duct, boiler, tank, reactor, turbine, furnace, or structural member are stripped or removed.^{7,49}

(1) (i) The owner or operator of a demolition operation is exempted from the requirements of this paragraph: *Provided*, (A) The amount of friable asbestos materials in the building or portion thereof to be demolished is less than 80 meters (ca. 260 feet) used on pipes, and less than 15 square meters (ca. 160 square feet) used on any duct, boiler, tank, reactor, turbine, furnace, or structural member, and (B) the notification requirements of paragraph (d)(1)(ii) are met.^{7,49}

(ii) Written notification shall be postmarked or delivered to the Administrator at least 20 days prior to commencement of demolition and shall include the information required by paragraph (d)(2) of this section, with

the exception of the information required by paragraphs (d)(2) (iii), (vi), (vii), (viii), and (ix) of this section, and shall state the measured or estimated amount of friable asbestos materials which is present. Techniques of estimation shall be explained. 27.49

(2) Written notice of intention to demolish or renovate shall be provided to the Administrator by the owner or operator of the demolition or renovation operation. Such notice shall be postmarked or delivered to the Administrator at least 10 days prior to commencement of demolition, or as early as possible prior to commencement of emergency demolition subject to paragraph (d) (6) of this section, and as early as possible prior to commencement of renovation. Such notice shall include the following information:

- (i) Name of owner or operator.
- (ii) Address of owner or operator.
- (iii) Description of the building, structure, facility, or installation to be demolished or renovated, including the size, age, and prior use of the structure, and the approximate amount of friable asbestos materials present.⁴⁹
- (iv) Address or location of the building, structure, facility, or installation.
- (v) Scheduled starting and completion dates of demolition or renovation.
- (vi) Nature of planned demolition or renovation and method(s) to be employed.
- (vii) Procedures to be employed to meet the requirements of this paragraph and paragraph (j) of this section.
- (viii) The name and address or location of the waste disposal site where the friable asbestos waste will be deposited.
- (ix) Name, title, and authority of the State or local governmental representative who has ordered a demolition which is subject to paragraph (d) (6) of this section.

(2) (i) For purposes of determining whether a planned renovating operation constitutes a renovation within the meaning of this paragraph, the amount of friable asbestos material to be removed or stripped shall be:

(A) For planned renovating operations involving individually non-scheduled operations, the additive amount of friable asbestos material that can be predicted will be removed or stripped at a source over the maximum period of time for which a prediction can be made. The period shall be not less than 30 days and not longer than one year.

(B) For each planned renovating operation not covered by paragraph (d) (3) (i) (A), the total amount of friable asbestos material that can be predicted will be removed or stripped at a source.

(ii) For purposes of determining whether an emergency renovating operation constitutes a renovation within the meaning of this paragraph, the amount of friable asbestos material to be removed or stripped shall be the total amount of friable asbestos material that will be removed or stripped as a result of the sudden, unexpected event that

necessitated the renovation.

(3) The following procedures shall be used to prevent emissions of particulate asbestos material to outside air:

(i) Friable asbestos materials, used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member, shall be removed from any building, structure, facility or installation subject to this paragraph. Such removal shall occur before wrecking or dismantling of any portion of such building, structure, facility, or installation that would break up the friable asbestos materials and before wrecking or dismantling of any other portion of such building, structure, facility, or installation, that would preclude access to such materials for subsequent removal. Removal of friable asbestos materials used on any pipe, duct, or structural member which are encased in concrete or other similar structural material is not required prior to demolition, but such materials shall be adequately wetted whenever exposed during demolition.⁴⁹

(ii) Friable asbestos materials used on pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members shall be adequately wetted during stripping, except as provided in paragraphs (d)(4)(iv), (d)(4)(v), or (d)(vii) of this section.⁴⁹

(iii) Pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members that are covered or coated with friable asbestos materials may be taken out of any building, structure, facility, or installation subject to this paragraph as units or in sections provided the friable asbestos materials exposed during cutting or disjoining are adequately wetted during the cutting or disjoining operation. Such units shall not be dropped or thrown to the ground, but shall be carefully lowered to ground level.⁴⁹

(iv) The stripping of friable asbestos materials used on any pipe, duct, boiler, tank, reactor, turbine, furnace, or structural member that has been removed as a unit or in sections as provided in paragraph (d)(4)(iii) of this section shall be performed in accordance with paragraph (d)(4)(ii) of this section. Rather than comply with the wetting requirement, a local exhaust ventilation and collection system may be used to prevent emissions to the outside air. Such local exhaust ventilation systems shall be designed and operated to capture the asbestos particulate matter produced by the stripping of friable asbestos materials. There shall be no visible emissions to the outside air from such local exhaust ventilation and collection systems except as provided in paragraph (f) of this section.⁴⁹

(v) All friable asbestos materials that have been removed or stripped shall be adequately wetted to ensure that such materials remain wet during all remaining stages of demolition or renovation and related handling operations. Such materials shall not be dropped or thrown to the ground or a lower floor. Such ma-

terials that have been removed or stripped more than 50 feet above ground level, except those materials removed as units or in sections, shall be transported to the ground via dust-tight chutes or containers.

(vi) Except as specified below, the wetting requirements of this paragraph are suspended when the temperature at the point of wetting is below 0°C (32°F). When friable asbestos materials are not wetted due to freezing temperatures, such materials on pipes, ducts, boilers, tanks, reactors, turbines, furnaces, or structural members shall, to the maximum extent possible, be removed as units or in sections prior to wrecking. In no case shall the requirements of paragraphs (d) (4) (iv) or (d) (4) (v) be suspended due to freezing temperatures.

(vii) For renovation operations, local exhaust ventilation and collection systems may be used, instead of wetting as specified in paragraph (d) (4) (ii), to prevent emissions of particulate asbestos material to outside air when damage to equipment resulting from the wetting would be unavoidable. Upon request and supply of adequate information, the Administrator will determine whether damage to equipment resulting from wetting to comply with the provisions of this paragraph would be unavoidable. Such local exhaust ventilation systems shall be designed and operated to capture the asbestos particulate matter produced by the stripping and removal of friable asbestos material. There shall be no visible emissions to the outside air from such local exhaust ventilation and collection systems, except as provided in paragraph (f) of this section.⁴⁹

(5) Sources subject to this paragraph are exempt from the requirements of §§ 61.05(a), 61.07, and 61.09.

(6) The demolition of a building, structure, facility, or installation, pursuant to an order of an authorized representative of a State or local governmental agency, issued because that building is structurally unsound and in danger of imminent collapse is exempt from all but the following requirements of paragraph (d) of this section:

(i) The notification requirements specified by paragraph (d) (2) of this section;

(ii) The requirements on stripping of friable asbestos materials from previously removed units or sections as specified in paragraph (d) (4) (iv) of this section;

(iii) The wetting, as specified by paragraph (d) (4) (v) of this section, of friable removed or stripped;

(iv) The portion of the structure being demolished that contains friable asbestos materials shall be adequately wetted during the wrecking operation.⁷

(e) Spraying. There shall be no visible emissions to the outside air from the spray-on application of materials containing more than 1 percent asbestos, on a dry weight basis, used on equipment and machinery, except as provided in paragraph (f) of this section. Materials sprayed on buildings, structures, structural members, pipes, and conduits shall contain less than 1 percent asbestos on a dry weight basis.⁴⁹

(1) Sources subject to this paragraph are exempt from the requirements of § 61.05(a), § 61.07, and § 61.09.

(2) Any owner or operator who intends to spray asbestos materials which contain more than 1 percent asbestos on a dry weight basis on equipment and machinery shall report such intention to the Administrator at least 20 days prior to the commencement of the spraying operation. Such report shall include the following information: 7.49

(i) Name of owner or operator.

(ii) Address of owner or operator.

(iii) Location of spraying operation.

(iv) Procedures to be followed to meet the requirements of this paragraph.

(3) The spray-on application of materials in which the asbestos fibers are encapsulated with a bituminous or resinous binder during spraying and which are not friable after drying is exempted from the requirements of paragraphs (e) and (e)(2) of this section. 49

(f) Rather than meet the no-visible-emission requirements as specified by paragraphs (a), (c), (d), (e), (h), (j), and (k) of this section, an owner or operator may elect to use the methods specified by § 61.23 to clean emissions containing particulate asbestos material before such emissions escape to, or are vented to, the outside air.

(g) Where the presence of uncombined water is the sole reason for failure to meet the no-visible-emission requirement of paragraphs (a), (c), (d), (e), (h), (j), or (k) of this section, such failure shall not be a violation of such emission requirements. 2.7

(1) Fabricating: There shall be no visible emissions to the outside air, except as provided in paragraph (f) of this section, from any of the following operations if they use commercial asbestos or from any building or structure in which such operations are conducted.

(1) The fabrication of cement building products.

(2) The fabrication of friction products, except those operations that primarily install asbestos friction materials on motor vehicles.

(3) The fabrication of cement or silicate board for ventilation hoods; ovens; electrical panels; laboratory furniture; bulkheads, partitions and ceilings for marine construction; and flow control devices for the molten metal industry.

(1) Insulating: Molded insulating materials which are friable and wet-applied insulating materials which are friable after drying, installed after the effective date of these regulations, shall contain no commercial asbestos. The provisions of this paragraph do not apply to insulating materials which are spray applied; such materials are regulated under § 61.22(e).

(1) Waste disposal for manufacturing, fabricating, demolition, renovation and spraying operations: The owner or operator of any source covered under the provisions of paragraphs (c), (d), (e), or (h) of this section shall meet the following standards:

lowing standards:

(1) There shall be no visible emissions to the outside air, except as provided in paragraph (j)(3) of this section, during the collection; processing, including incineration; packaging; transporting; or deposition of any asbestos-containing waste material which is generated by such source.

(2) All asbestos-containing waste material shall be deposited at waste disposal sites which are operated in accordance with the provisions of § 61.25.

(3) Rather than meet the requirement of paragraph (j)(1) of this section, an owner or operator may elect to use either of the disposal methods specified under (j)(3)(i) and (ii) of this section, or an alternative disposal method which has received prior approval by the Administrator:

(i) Treatment of asbestos-containing waste material with water:

(A) Control device asbestos waste shall be thoroughly mixed with water into a slurry and other asbestos-containing waste material shall be adequately wetted. There shall be no visible emissions to the outside air from the collection, mixing and wetting operations, except as provided in paragraph (f) of this section.

(B) After wetting, all asbestos-containing waste material shall be sealed into leak-tight containers while wet, and such containers shall be deposited at waste disposal sites which are operated in accordance with the provisions of § 61.25.

(C) The containers specified under paragraph (j)(3)(i)(B) of this section shall be labeled with a warning label that states:

CAUTION

Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous
to Your Health

Alternatively, warning labels specified by Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.93a(g)(2)(ii) may be used.

(ii) Processing of asbestos-containing waste material into non-friable forms:

(A) All asbestos-containing waste material shall be formed into non-friable pellets or other shapes and deposited at waste disposal sites which are operated in accordance with the provisions of § 61.25.

(B) There shall be no visible emissions to the outside air from the collection and processing of asbestos-containing waste material, except as specified in paragraph (f) of this section.

(4) For the purposes of this paragraph (j), the term all asbestos-containing waste material as applied to demolition and renovation operations covered by paragraph (d) of this section includes only friable asbestos waste and control device asbestos waste.

(k) Waste disposal for asbestos mills:

The owner or operator of any source covered under the provisions of paragraph (a) of this section shall meet the following standard:

(1) There shall be no visible emissions to the outside air, except as provided in paragraph (k)(3) of this section, during the collection, processing, packaging, transporting or deposition of any asbestos-containing waste material which is generated by such source.

(2) All asbestos-containing waste material shall be deposited at waste disposal sites which are operated in accordance with the provisions of § 61.25.

(3) Rather than meet the requirement of paragraph (k)(1) of this section, an owner or operator may elect to meet the following requirements in paragraphs (k)(3)(i) and (ii), or use an alternative disposal method which has received prior approval by the Administrator:

(i) There shall be no visible emissions to the outside air from the transfer of control device asbestos waste to the tailings conveyor, except as provided in paragraph (f) of this section. Such waste shall be subsequently processed either as specified in paragraph (k)(3)(ii) of this section or as specified in paragraph (j)(3) of this section.

(ii) All asbestos-containing waste material shall be adequately mixed, with a wetting agent recommended by the manufacturer of the agent to effectively wet dust and tailings, prior to deposition at a waste disposal site. Such agent shall be used as recommended for the particular dust by the manufacturer of the agent. There shall be no discharge of visible emissions to the outside air from the wetting operation except as specified in paragraph (f) of this section. Wetting may be suspended when the ambient temperature at the waste disposal site is less than -9.5°C (ca. 15°F). The ambient air temperature shall be determined by an appropriate measurement method with an accuracy of ±1°C (±2°F) and recorded at least at hourly intervals during the period that the operation of the wetting system is suspended. Records of such temperature measurements shall be retained at the source for a minimum of two years and made available for inspection by the Administrator.

(1) The owner of any inactive waste disposal site, which was operated by sources covered under § 61.22 (a), (c) or (h) and where asbestos-containing waste material produced by such sources was deposited, shall meet the following standards:

(1) There shall be no visible emissions to the outside air from an inactive waste disposal site subject to this paragraph, except as provided in paragraph (i)(5) of this section.

(2) Warning signs shall be displayed at all entrances, and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material was deposited, at intervals of 100 m (ca. 330 ft) or less, except as specified in paragraph (i)(4)

of this section. Signs shall be posted in such a manner and location that a person may easily read the legend. The warning signs required by this paragraph shall conform to the requirements of 20" x 14" upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

LEGEND

ASBESTOS WASTE DISPOSAL SITE

Do Not Create Dust

Breathing Asbestos is Hazardous to Your Health

Notation

1" Sans Serif, Gothic or Block

¾" Sans Serif, Gothic or Block

14 Point Gothic

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(3) The perimeter of the site shall be fenced in a manner adequate to deter access by the general public, except as specified in paragraph (1)(4) of this section.

(4) Warning signs and fencing are not required where the requirements of paragraphs (1)(5) (i) or (ii) of this section are met, or where a natural barrier adequately deters access by the general public. Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately deters access to the general public.

(5) Rather than meet the requirement of paragraph (1)(1) of this section, an owner may elect to meet the requirements of this paragraph or may use an alternative control method for emissions from inactive waste disposal sites which has received prior approval by the Administrator.

(i) The asbestos-containing waste material shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material, and a cover of vegetation shall be grown and maintained on the area adequate to prevent exposure of the asbestos-containing waste material; or

(ii) The asbestos-containing waste material shall be covered with at least 60 centimeters (ca. 2 feet) of compacted non-asbestos-containing material and maintained to prevent exposure of the asbestos-containing waste; or

(iii) For inactive waste disposal sites for asbestos tailings, a resinous or petroleum-based dust suppression agent which effectively binds dust and controls wind erosion shall be applied. Such agent shall be used as recommended for the particular asbestos tailings by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste crankcase oil is not considered a dust suppression agent.⁷

§ 61.23 Air-cleaning.

If air-cleaning is elected, as permitted by §§ 61.22(f) and 61.22(d)(4)(17), the requirements of this section must be met.⁷

(a) Fabric filter collection devices must be used, except as noted in paragraphs (b) and (c) of this section. Such devices must be operated at a pressure drop of no more than 4 inches water gage, as measured across the filter fabric. The airflow permeability, as determined by ASTM method D737-69, must not exceed 30 ft³/min/ft² for woven fabrics or 35 ft³/min/ft² for felted fabrics, except that 40 ft³/min/ft² for woven and 45 ft³/min/ft² for felted fabrics is allowed for filtering air from asbestos ore dryers. Each square yard of felted fabric must weigh at least 14 ounces and be at least one-sixteenth inch thick throughout. Synthetic fabrics must not contain fill yarn other than that which is spun.

(b) If the use of fabric filters creates a fire or explosion hazard, the administrator may authorize the use of wet collectors designed to operate with a unit contacting energy of at least 40 inches water gage pressure.

(c) The administrator may authorize the use of filtering equipment other than that described in paragraphs (a) and (b) of this section if the owner or operator demonstrates to the satisfaction of the administrator that the filtering of particulate asbestos material is equivalent to that of the described equipment.

(d) All air-cleaning equipment authorized by this section must be properly installed, used, operated, and maintained. Bypass devices may be used only during upset or emergency conditions and then only for so long as it takes to shut down the operation generating the particulate asbestos material.

§ 61.24 Reporting.

The owner or operator of any existing source to which this subpart is applicable shall, within 90 days after the effective date, provide the following information to the administrator:

(a) A description of the emission control equipment used for each process;

(b) If a fabric filter device is used to control emissions, the pressure drop across the fabric filter in inches water gage.

(1) If the fabric filter device utilizes a woven fabric, the airflow permeability in ft³/min/ft²; and, if the fabric is synthetic, indicate whether the fill yarn is spun or not spun.

(2) If the fabric filter device utilizes a felted fabric, the density in oz/yd², the minimum thickness in inches, and the airflow permeability in ft³/min/ft².

(c) For sources subject to §§ 61.22(j) and 61.22(k):

(1) A brief description of each process that generates asbestos-containing waste material.

(2) The average weight of asbestos-containing waste material disposed of, measured in kg/day.

(3) The emission control methods used in all stages of waste disposal.

(4) The type of disposal site or incineration site used for ultimate disposal, the name of the site operator, and the name and location of the disposal site.⁷

(d) For sources subject to § 61.22(l):

(1) A brief description of the site.

(2) The method or methods used to comply with the standard, or alternative procedures to be used.⁷

(e) Such information shall accompany the information required by § 61.10. The information described in this section shall be reported using the format of Appendix A of this part.

(Sec. 114 of the Clean Air Act as amended (42 U.S.C. 7414))^{40,47}

§ 61.25 Waste disposal sites.

In order to be an acceptable site for disposal of asbestos-containing waste material under § 61.22 (j) and (k), an active waste disposal site shall meet the requirements of this section.

(a) There shall be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited, except as provided in paragraph (e) of this section.

(b) Warning signs shall be displayed at all entrances, and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material is deposited, at intervals of 100 m (ca. 330 ft) or less except as specified in paragraph (d) of this section. Signs shall be posted in such a manner and location that a person may easily read the legend. The warning signs required by this paragraph shall conform to the requirements of 20" x 14" upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

LEGEND

ASBESTOS WASTE DISPOSAL SITE

Do Not Create Dust

Breathing Asbestos is Hazardous to Your Health

Notation

1" Sans Serif, Gothic or Block

¾" Sans Serif, Gothic or Block

14 Point Gothic

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(c) The perimeter of the disposal site shall be fenced in order to adequately deter access to the general public except as specified in paragraph (d) of this section.

(d) Warning signs and fencing are not required where the requirements of paragraph (e)(1) of this section are met, or where a natural barrier adequately deters access to the general public. Upon request and supply of appropriate information, the Administrator

tor will determine whether a fence or a natural barrier adequately restricts access to the general public.

(c) Rather than meet the requirement of paragraph (a) of this section, an owner or operator may elect to meet the requirements of paragraph (e) (1) or (e) (2) of this section, or may use an alternative control method for emissions from active waste disposal sites which has received prior approval by the Administrator.

(1) At the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 24-hour period shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material.

(2) At the end of each operating day, or at least once every 24-hour period while the disposal site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 24-hour period shall be covered with a resinous or petroleum-based dust suppression agent which effectively binds dust and controls wind erosion. Such agent shall be used as recommended for the particular dust by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste crankcase oil is not considered a dust suppression agent.

Probably no signs needed as long as the stuff is buried within 24 Hours.

38 FR 8826, 4/6/73 (1)

as amended

39 FR 15398, 5/3/74 (2)
40 FR 48299, 10/14/76 (7)
42 FR 12127, 3/2/77 (36)
42 FR 41424, 8/17/77 (40)
43 FR 8800, 3/3/78 (47)
43 FR 26372, 6/19/78 (49)

760255 1982

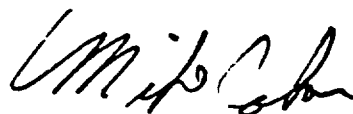
760255

January 22, 1982

TO: J. W. Wolter

Re: MSHA/OSHA Jurisdictional Dispute

The interim funding bill for MSHA which transferred jurisdictional authority for sand, gravel and stone mining to OSHA was vetoed by President Reagan. Therefore, the transfer has not taken place. In the event a similar bill is passed, we will of course investigate whether or not it was within Congress's intent to include vermiculite in the transferred mining activities.



M. B. Cohan

MBC:sl

760256

CONSTRUCTION

SEP 24 1981

NUMBER: 67932

PRODUCTS

GROUP: Zonolite Ore Research

DIVISION

DATE: September 4, 1981

CHARGE NO.: 1075

REQUESTOR: Paul Connor

MARKETING or MANUFACTURING APPRO

NAME: T. E. Hamilton

APPROVED:

REQUEST FOR TECHNICAL SERVICE

PAGE 1

PROBLEM TITLE: Environmental Evaluation - Air - Fibrous Materials.

SIGNIFICANCE: The evaluation of workplace air on a periodic basis is necessary to comply with the air sampling section of the OSHA Asbestos Standard.

SPECIFIC OBJECTIVE: Determine fiber counts for filter media.

SUGGESTED APPROACH: Phase contrast microscopy.

DEADLINE (Last day information will be of value): 2 weeks.

DETAILS OF PROBLEM: Please evaluate engineering samples from Enoree, SC
EM-1, EM-2, EM-3, EM-4ACCEPTED BY RESEARCH DEPT.: *g h y*

DATE: 9/4/81

ASSIGNED TO: B. O. Lemy

ADDITIONAL COPIES: Original to Library; H. C. Duecker, F. W. Eaton, T. E. Hamilton,
J. W. Wolter, E. S. Wood, P. Connor

CONFIDENTIAL

REQUEST FOR TECHNICAL SERVICE

NUMBER: 67932
GROUP: ZONOLITE Ore Rese
ACTUAL COST: \$305.00
REPORTING DATE: 9/22/81

760257

SUMMARY:

Four engineering samples were received from Enoree, South Carolina, and evaluated for their fiber content.

RESULTS:

The results are as shown on the attached Air Sampling Record Sheet.

Barbara J. O'Leary
Barbara J. O'Leary

BJO:mlr

attachment

