
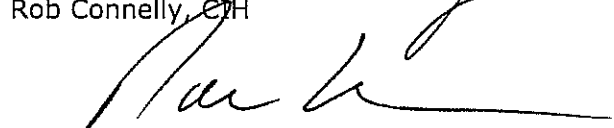


Lawrence Berkeley National Laboratory

## Asbestos Management Plan

Revision 4.1  
Revision Date: 15 March, 2007

Prepared by:  3.15.07  
Rob Connelly, CIH Date

Approved by:  3/15/07  
Paul Blodgett, CIH, IH Group Leader Date

# ASBESTOS MANAGEMENT PLAN

## Lawrence Berkeley National Laboratory

Contents	Page
I. POLICY.....	3
II. PURPOSE .....	3
III. APPLICABLE REGULATIONS .....	3
IV. DEFINITIONS .....	4
V. GENERAL ASBESTOS BACKGROUND INFORMATION .....	8
VI. HAZARDOUS PROPERTIES OF ASBESTOS.....	8
VII. EXAMPLES OF ASBESTOS MANUFACTURED MATERIALS.....	9
VIII. RESPONSIBILITIES.....	10
IX. GUIDELINES.....	13
A. MANAGEMENT OF THE ASBESTOS PROGRAM.....	13
B. BUILDING SURVEYS/REPAIRS.....	13
C. BULK SAMPLING.....	13
D. EMPLOYEE NOTIFICATION .....	13
E. EXPOSURE MONITORING & JOBSITE CLEARANCE LEVELS .....	14
F. FLOORING MATERIAL MAINTENANCE .....	14
G. HYGIENE FACILITIES .....	14
H. IDENTIFICATION OF ACM IN BUILDINGS .....	15
I. LABELING AND POSTING .....	15
J. MEDICAL SURVEILLANCE .....	15
K. NEW PRODUCTS CONTAINING ASBESTOS.....	16
L. PROTECTIVE CLOTHING .....	16
M. REGULATORY AGENCY NOTIFICATION .....	16
N. RESPIRATORS .....	16
O. ROOFING PRODUCTS - ASPHALT .....	17
P. SHEETROCK (DRYWALL).....	18
Q. TRAINING.....	18
X. ASBESTOS REMOVAL AND REPAIR PROCEDURES.....	19
XI. WASTE DISPOSAL .....	25

## APPENDICES

APPENDIX A - ASBESTOS LABELS AND SIGNS

APPENDIX B - CHECKLIST FOR AUDITING ASBESTOS WORK PRACTICES

APPENDIX C - ACM DAMAGE CATEGORIES & CORRECTIVE ACTION

# ASBESTOS MANAGEMENT PLAN

## I. Policy

Lawrence Berkeley National Laboratory (LBNL) has adopted an Asbestos Management Plan for asbestos. The policy is to remove or repair asbestos containing materials that pose a significant health hazard due to location or condition. Asbestos that is in good condition will be maintained in a condition that will not produce a significant risk to LBNL personnel. Asbestos containing material will be removed, repaired and/or protected prior to planned renovations, demolitions, or modifications that may result in its disturbance. All removal and repairs will be conducted in a safe manner that is consistent with applicable regulations.

*Italicized text indicates elements of this program that are not required by OSHA regulation, but may be required by other state or local regulation, or are included to enhance LBNL's program effectiveness.*

## II. Purpose

The purpose of this document is to outline how the management of asbestos-containing materials is performed at Lawrence Berkeley National Laboratory to ensure that exposure of Lab employees, visitors and subcontractor employees to asbestos is minimized.

## III. Applicable Regulations

In addition to this document, the following regulations contain applicable information:

- 29 CFR 1926.32, Definitions;
- 29 CFR 1910.1001, Asbestos Occupational Safety and Health Standards, Department of Labor;
- 29 CFR 1926.1101, Asbestos Safety and Health Standards for the (formerly 1926.58) Construction Industry, Department of Labor;
- 40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), Environmental Protection Agency (EPA);
- 40 CFR Part 763 (guidance), Asbestos Hazard Emergency Response Act (AHERA) - EPA regulations for schools;

- *Reg. 11, Rule 2, Asbestos Demolition, Renovation and Manufacturing Bay Area Air Quality Management District (BAAQMD); and,*
- *Title 22, California Code of Regulations, Hazardous Waste Disposal and Transportation, California Department of Toxic Substances Control (DTSC).*

*The interplay of EPA, OSHA, and BAAQMD regulations makes asbestos compliance somewhat complicated. Therefore, frequent consultation with an EH&S Industrial Hygienist, the Environmental Protection Group, Waste Management Group and/or LBNL Environmental Counsel on asbestos-related issues is encouraged.*

#### IV. Definitions

**Abatement:** Removal, encapsulation, enclosure, repair or demolition of ACM.

**ACM:** Asbestos Containing Material. Building materials that contain asbestos in an amount greater than 1.0% by weight, area, or count.

**ACM Waste:** Waste materials which contain friable asbestos in an amount of 1% or greater by weight, area, or count, and asbestos-contaminated materials (e.g., protective clothing and equipment).

**Accredited:** The Analytical laboratory used for asbestos analysis must participate in a quality assurance program administered by the American Industrial Hygiene Association (AIHA) or the National Institute of Occupational Safety and Health (NIOSH).

**Asbestos:** A generic term referring to naturally-occurring fibrous mineral silicates. The three most common types are chrysotile (white) asbestos, amosite (brown) asbestos, and crocidolite (blue) asbestos.

**CIH:** Certified Industrial Hygienist. A person who is certified in the comprehensive practice of industrial hygiene by the American Board of Industrial Hygiene.

**Class I Asbestos Work:** Activities involving the removal of thermal system insulation (TSI) and surfacing ACM.

**Class II Asbestos Work:** The removal of asbestos-containing wallboard, floor tile, roofing materials, transite, construction mastic, gaskets, etc. Does not involve the removal of TSI or surfacing materials.

**Class III Asbestos Work:** Activities involving the repair and maintenance operations, where ACM (including TSI and surfacing materials) are likely to be disturbed. The amount removed must fit into 1 glove bag or waste bag less than 60" in width.

**Class IV Asbestos Work:** Maintenance or custodial activities during which employees contact ACM or PACM, and activities to clean up waste and debris containing ACM and PACM.

**Competent Person:** One who meets the requirements in 29 CFR 1926.32 (f), and is capable of identifying existing asbestos hazards in the workplace, able to select the appropriate control strategy, and has the authority to take prompt corrective measures to mitigate them.

**Composite:** Several individual parts combining to form one integral system. For example, a composite asbestos sample of a sheet rock wall system with asbestos-containing joint compound would be a sample of the entire wall material, (i.e., joint compound, tape, and wallboard combined).

**Containment:** The construction of an impermeable barrier around ACM to prevent the release of fibers into occupied areas during abatement. In addition, a containment controls the amount of incoming air so that a negative pressure in the work area can be maintained.

**Contractor:** An individual or business that LBNL arranges to perform work involving ACM.

**Cumulative:** A series of small renovations or removals of RACM performed during a calendar year.

**Demolition:** The wrecking or taking out of any load-supporting structural member of a structure. (Note: This definition is for BAAQMD purposes).

**Encapsulant:** A liquid material that can be applied to ACM that controls the possible release of asbestos fibers from the material. Bridging encapsulants do this by creating a membrane over the surface, while penetrating encapsulants penetrate into the material and bind the components together.

**Encapsulation:** Application of an encapsulant to ACM to control the release of asbestos fibers.

**Excursion Limit:** Exposure to asbestos in excess of 1.0 fiber per cubic centimeter of air (1.0 f/cc) as averaged over a sampling period of thirty minutes.

**Fiber.** A particulate form of asbestos five micrometers or longer with a length to diameter ratio of at least 3 to 1 as determined by PCM.

**Friable:** A material containing asbestos that can be crumbled, pulverized or reduced to a powder when dry, under hand pressure, or that has been crumbled, pulverized, or reduced to a powder.

**HEPA Filter:** A high efficiency particulate air filter capable of filtering 0.3 micrometer particles with 99.97 percent efficiency. This filter is the only type of filter suitable for asbestos work, both in respirators and negative air machines.

**Industrial Hygienist:** Professional qualified by education, training and experience to anticipate, recognize evaluate and develop controls for occupational health hazards.

**Negative Exposure Assessment:** Demonstration by exposure monitoring that employee exposure during an operation is expected to be consistently below the PEL or excursion limit.

**Negative Pressure Ventilation System:** A portable exhaust system equipped with HEPA filtration and capable of maintaining a negative pressure of 0.02 inches (or greater) of water in a contained area.

**Nonfriable ACM (Category I):** Intact asbestos-containing packings, gaskets, resilient floor coverings, and asphalt roofing products.

**Nonfriable ACM (Category II):** Asbestos-containing material (excluding Category I) that when dry and in its present form, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Includes asbestos cement products, transite board, pipe, plaster, stucco, paint, and mastics.

**PACM:** Presumed Asbestos Containing Material. Material that may contain asbestos and has not been sampled for asbestos content, shall be assumed to contain asbestos and treated accordingly.

**PCM:** Phase Contrast Microscopy. An analytical method used to count airborne fibers. Results are given as fibers per cubic centimeter of air (f/cc). OSHA employee exposure standards are based on this method. This method counts all fibers greater than 5 microns in length, without specifically identifying the fiber type (e.g., cotton, fiberglass, nylon etc., will also be counted).

**PEL:** Permissible Exposure Limit. The eight hour time-weighted average concentration of allowable airborne asbestos fibers to which an employee may be exposed. The limit for asbestos is 0.1 fibers per cubic centimeter (f/cc) of air.

**Personal Exposure Monitoring:** Determination of an employee's exposure from breathing zone (i.e., 2 foot radius surrounding the head) air samples representative of the 8-hour TWA or 30 minute excursion limit.

**Planned Renovation:** Renovation, or a number of renovations, that can be predicted to occur within one period of time, not to exceed one year.

**PLM:** Polarized Light Microscopy. Analytical method used to determine type and quantity (i.e., percent) of asbestos present in a bulk sample.

**Regulated Asbestos Containing Material (RACM):**

- A. Friable ACM
- B. Nonfriable Category I ACM that has, or will become friable, or that has been subjected to sanding, drilling, grinding, cutting, or abrading.
- C. Nonfriable Category II ACM that may become crumbled, pulverized, or reduced to powder by the forces expected to act upon the material in the course of demolition or renovation.

**Regulated Asbestos Work Area:** An area in which the exposure to asbestos fibers can reasonably be expected to exceed the PEL of 0.1 fibers per cubic centimeter of air. No one may enter the regulated area without training and proper protective equipment. Regulated areas are restricted by barriers, asbestos warning tape, signs, etc. (See Appendix A for proper signage).

**Renovation:** The modifying of any existing structure or portion thereof.

**Reportable:** Defined by the BAAQMD as every demolition, even if no RACM is involved, and renovations involving removal of RACM greater than or equal to 100 linear feet, 100 square feet (ft<sup>2</sup>), or 35 cubic feet (ft<sup>3</sup>).

**Structure (in AHERA):** A microscopic bundle, cluster, fiber, or matrix which may contain asbestos.

**Structural Member:** Any load-supporting member of a facility, such as beams and load-supporting walls.

**Surfacing Material:** Material that is sprayed, trowelled or otherwise applied to surfaces (e.g., fireproofing on structural steel, acoustical plaster on ceilings).

**Surfactant:** A chemical wetting agent added to water to improve penetration of the water into a solid material.

**TEM:** Transmission Electron Microscopy. This method counts all fiber sizes (including those less than 5 microns in length) and positively identifies the type of fiber. The results are reported in structures/cc. This method is not recognized by the OSHA asbestos standard but is specified in the AHERA standard.



**TSI:** Thermal System Insulation. Insulation applied to pipes, fittings, boilers, ducts, etc., to prevent heat loss or gain.

**TWA:** Time Weighted Average. Average airborne exposure to a substance as averaged over an 8-hour workday.

**Visible Emissions:** Any release of ACM that is visually detectable without the aid of instruments.

## V. General Asbestos Background Information

Asbestos is a generic term referring to fibrous mineral silicates that were used extensively from about 1900 until very recently in the manufacture of construction and industrial products. Some products are still manufactured with a significant asbestos content. Section VII lists various products that have been manufactured with asbestos. This list is not exhaustive, other products not listed may also contain asbestos.

Asbestos-containing materials can be divided into two general categories; friable and non-friable. Friable ACM products are those that can be readily crumbled or powdered by hand pressure, and are of more concern than non-friable ACM because of the greater ease of fiber release. Examples of friable ACM include pipe insulation, sprayed-on acoustical insulation, and sprayed on fireproofing. Intact and sealed friable asbestos materials are considered non-friable and do not pose a health risk if they are undisturbed and undamaged.

Non-friable ACMs generally possess a strong binder such as cement or vinyl, which stabilizes the asbestos, reducing the likelihood of generating airborne asbestos dust. However, specific actions such as sanding, grinding, cutting or drilling of non-friable asbestos can result in the release of asbestos fibers. Examples of non-friable asbestos include intact vinyl asbestos floor tiles, roofing felts/shingles, and asbestos cement products such as transite panels and pipes.

## VI. Hazardous Properties of Asbestos

Asbestos is primarily an inhalation hazard. Asbestos-related diseases caused by the inhalation of fibers typically occur 10 to 45 years after exposure. Asbestos does not cause any acute (immediate) effects, except skin warts that are mentioned below.

1. Asbestosis - permanent fibrotic scarring of lung tissue, which results in a reduced ability to breathe, cardiovascular failure, and in severe cases, death.

2. Lung Cancer - occurs more often in people exposed to asbestos than in non-exposed groups. This effect of asbestos exposure is greatly magnified by cigarette smoking.
3. Mesothelioma - cancer of the lining of the chest and abdominal cavity. A rare disease that occurs almost exclusively in those exposed to asbestos.
4. Skin warts - single asbestos fibers imbedded in the skin may cause non-cancerous warts. They heal when the fiber is removed.

Asbestos is a demonstrated human carcinogen. Employee exposure to airborne asbestos *should be limited to levels that are "As Low As Reasonably Achievable" (ALARA), and must be limited to levels below applicable occupational exposure limits (see below).*

## **VII. Examples of Materials That Have Been Manufactured With Asbestos**

- Cement/asbestos panels and pipes (transite)
- High temperature gaskets
- Pipe insulation (block, corrugated aircell, etc.)
- Mastic for vinyl flooring
- Vinyl floor tiles and sheet vinyl flooring
- Wallboard (sheetrock)
- Electric wiring insulation
- Taping or joint compounds
- Spray applied fireproofing and insulation
- Roofing felt/shingles/flashing
- Automotive brake linings and pads
- Ceiling tiles
- Fire resistant gloves, clothing
- HVAC duct insulation & tape
- Linoleum and other resilient flooring
- Paint
- Fire doors
- Window putty

- Plaster/stucco
- Elevator/crane brake shoes

## VIII. Responsibilities

### A. Building Managers

*Notify EH&S of suspected or known ACM that may pose a health hazard.*

### B. Environmental Protection Group (EPG)

- 1. Submit written notification to the BAAQMD at least ten working days in advance of all demolitions (notification needs to be given at all times, even when ACM is not present) and renovations involving removal of RACM greater than or equal to 100 linear feet, 100 ft<sup>2</sup>, or 35 ft<sup>3</sup> unless the notification is completed by a subcontractor performing the work.*
- 2. Submit written notifications to BAAQMD of cumulative renovations (during a calendar year) that involve reportable amounts of RACM. (Note: This is a shared responsibility with Facilities, EPG and Industrial Hygiene).*
- 3. Prepare written requests to BAAQMD for approval of alternate removal methods, such as dry removals.*

### C. Facilities Division

- 1. As custodian of the LBNL physical plant, maintain the integrity and safety of ACM.*
- 2. Asbestos Bulk Sampling:*
  - A. Ensure that buildings and equipment are surveyed for ACM prior to demolitions and renovations. (Note: This is a dual responsibility shared with Industrial Hygiene.)*
  - B. Collect bulk samples of suspected ACM as needed.*
  - C. Send bulk samples for analysis to an AIHA accredited laboratory as sampling is needed.*
- 3. Ensure industrial hygiene services are contracted for large-scale asbestos abatement projects. The purpose of this is to provide day to day on-site industrial hygiene oversight for the project.*
- 4. Include site specific contract specifications for large-scale asbestos abatement projects.*

5. *Notify the Industrial Hygienist and/or Environmental Protection of every demolition, whether or not it involves asbestos, and every removal of RACM prior to starting.*
6. *Ensure that contract specifications are followed by abatement contractors. (Note: This is a shared responsibility with Industrial Hygiene).*
7. *Submit copies of all contractor air-monitoring results to an EH&S Industrial Hygienist.*
8. *Notify an EH&S Industrial Hygienist of all asbestos abatement projects involving Class I & II work verbally as far in advance as feasible.*
9. Perform asbestos abatement or encapsulating work in accordance with Section X of this program.
10. Ensure Facilities employees performing work with ACM or potentially exposed to asbestos at a concentration above the PEL or excursion limit have current training appropriate for the type of asbestos work they are performing.
11. *Obtain written approval from an EH&S Industrial Hygienist prior to purchasing new ACM.*

#### **E. EH&S - Industrial Hygienist**

1. *Review specifications for large scale abatement projects and associated compliance plans involving the large scale disturbance of ACM.*
2. Ensure buildings and equipment are surveyed for ACM by Facilities or contract consultants prior to demolitions and renovations. (Note: This is a dual responsibility shared with Facilities.)
3. Perform representative personal air monitoring and area air-monitoring (e.g., clearance sampling) as appropriate for asbestos abatement work involving LBNL employees. Notify the employee and the employee's supervisor of the results in writing within five working days of their receipt.
4. *Perform quantitative respirator fit tests annually for employees routinely involved with asbestos abatement work. (Note: Given the limited amount of asbestos work performed by asbestos trained employees in Facilities, employee fit tests may not be current. In these cases, asbestos work may not be performed until the fit test is made current again).*
5. *An EH&S Industrial Hygienist trained in each of the following specialty areas must be available for consultation and inspection: EPA approved Building*

*Inspector / Management Planner, Contractor/Supervisor, Project Designer, with current certification. Note: Certified Industrial Hygienists do not have to attend the Building Inspector course (29 CFR 1926.1101 (k)(ii)(B)).*

#### **F. Health Services Group**

Provide, as necessary, complete asbestos physical examinations as described in 29 CFR 1926.1101 or 29 CFR 1910.1001 for LBNL employees that may be enrolled in the asbestos medical surveillance program.

#### **G. Supervisors of employees who routinely work with or may disturb ACM**

1. Ensure employees are provided the appropriate protective clothing and respiratory protection.
2. Ensure employees who conduct asbestos work comply with LBNL's Asbestos Management Plan and 29 CFR 1926.1101. Also ensure employees handling asbestos, or who may be exposed to asbestos at or above the PEL or excursion limit, have received required training.
3. Ensure appropriate employees receive medical surveillance if necessary.

#### **H. Waste Management Group**

1. Provide assistance with labeling, storage and disposal requirements for ACM. Select a *DTSC approved* disposal site for all RACM and asbestos contaminated waste material. (*Note: DTSC approvals are not required for non-RACM materials, including undamaged floor tiles and sheetrock containing less than 1% asbestos*).
2. Ensure proper packing and loading of ACM onto transport vehicles.
3. *Ensure vehicles transporting RACM and asbestos contaminated waste materials (e.g., clothing and equipment) are placarded in compliance with BAAQMD Rule 11-2-304.5, and that waste shipment records comply with BAAQMD Rule 11-2-502.*
4. Manifest RACM and asbestos contaminated waste materials from LBNL to disposal site.
5. Maintain disposal records.
6. Ensure Hazardous Waste Handling Facility employees who handle asbestos containing waste are adequately trained.
7. *Provide the Facilities Division with necessary waste disposal information prior to abatement projects.*

## IX. Guidelines

### A. Management of the Asbestos Program

*The EH&S Industrial Hygiene Group manages the institutional Asbestos Program and its programmatic elements. Actual asbestos support functions, provided by the Facilities Division, or its subcontractors, are managed directly by the Facilities Division.. This will entail active involvement, by EH&S and Facilities, with LBNL asbestos control activities relating to demolition, renovation, maintenance activities or other instances involving the possible disturbance of ACM.*

### B. Building Surveys / Repairs

1. Buildings constructed after 1979 generally do not contain friable asbestos, and generally don't need to be inspected for these materials prior to renovation. For building demolition projects, there are no end dates for building survey purposes.
2. *The Facilities Division is responsible for the repair of damaged or deteriorated (unsealed ends, nicks, loose pieces of insulation, abraded floor tiles, etc.) friable and non-friable ACM. The chart in Appendix C will be used to decide what type of repair is necessary and how soon it needs to be performed. An Industrial Hygienist will be available for consultation on these decisions.*
3. Pre-renovation / Demolition: Facilities is responsible for surveying the affected structure or areas for ACM prior to any demolition or renovation, *per 40 CFR 61.145 and BAAQMD 11-2-303.8.*
4. If suspected ACM has not undergone laboratory analysis, it should be assumed to contain asbestos and treated accordingly.

### C. Bulk Sampling

1. The testing, evaluation and sample collection of materials for asbestos analysis shall be conducted by an accredited asbestos building inspector (40 CFR Part 763) or by a CIH.
2. Analysis of these samples shall be performed by persons or laboratories with proficiency demonstrated by participation in the National Voluntary Laboratory Accreditation Program (NVLAP).

### D. Employee Notification

Air monitoring results from the Industrial Hygiene Group must be given in writing to the affected employee and their supervisor within five working days of their receipt.

#### E. Exposure Monitoring and Jobsite Clearance Levels

1. The current Federal Occupational Safety and Health Administration (OSHA) "Permissible Exposure Limit" (PEL) is 0.1 fibers per cubic centimeter (f/cc) of air averaged over an 8-hour day. The excursion limit for any 30 minute exposure is 1.0 f/cc of air.
2. Initial monitoring of LBNL employees who are or may be reasonably expected to be exposed to airborne asbestos concentrations exceeding the PEL or Excursion Limit will be performed by the Industrial Hygiene Group. Monitoring may be discontinued when results show that employee exposures are consistently below the PEL and Excursion Limit. Initial monitoring will be repeated whenever there has been a change in the control equipment, process, personnel, or work practices that may result in new or additional exposures.
3. *Acceptable job-site clearance levels are 70 structures per square millimeter (st/mm<sup>2</sup>) by TEM or 0.01 fibers per cubic centimeter (f/cc). Clearance sampling is not required for small-scale short duration projects.*

#### F. Flooring Material Maintenance

1. *Rubber wheels (i.e., not plastic) should be used on chairs that are in contact with resilient flooring (e.g., linoleum, floor tiles, sheet flooring). The purpose of this requirement is to prevent floor abrasion and the subsequent creation of asbestos-containing dust. The Facilities Work Request Center at extension 6274 is available for assistance in the replacement of wheels. The cost of the rubber wheels will be at the expense of the owner of the chair.*
2. Sanding of the flooring, its backing, or mastic, is prohibited.
3. Stripping of floors shall be conducted using low abrasion pads at speeds lower than 300 rpm, and wet methods.
4. Burnishing or dry buffing may be performed only on flooring that has sufficient finish so that the pad cannot contact the asbestos-containing material.
5. Dust and debris in an area containing visibly deteriorated ACM shall not be dusted, swept dry, or vacuumed without the use of a HEPA vacuum by AHERA asbestos trained Facilities workers.

#### G. Hygiene Facilities

1. For Class 1 asbestos jobs involving over 25 linear or 10 square feet of TSI or surfacing material, there shall be a decontamination area (29CFR 1926.1101 (j)) consisting of an equipment room, shower area, and clean room, in series and connected to the Regulated Area. Employees must enter and exit through the decontamination area.

2. For Class 1 asbestos jobs involving less than 25 linear or 10 ft<sup>2</sup>, and Class 2 or 3 work which is above the PEL or where there is no negative exposure assessment, an equipment room that is adjacent to the Regulated Area shall be constructed. The floor area and horizontal work surface shall be constructed of 6-mil plastic (minimum), and be large enough to accommodate the cleaning of equipment and surfaces of waste containers. Work clothing must be HEPA vacuumed before it is removed and employees must enter or exit through the equipment room.
3. Class IV work at LBNL does not require decontamination facilities. Employees trained at this level will not work in Regulated areas or be involved in the cleanup of ACM or PACM.

#### **H. Identification of ACM in Buildings**

1. Prior to remodeling, modifying, demolishing, or otherwise disturbing any facility component, the job site will be visually inspected by a qualified AHERA asbestos building inspector. If ACM is potentially present and an adequate prior survey of the area has not been conducted, a survey must be performed to identify any ACM that may be disturbed by the planned work. Any such materials that are identified as ACM will be removed or protected from disturbance before the work can proceed. (See 40 CFR 61.145 (c) and BAAQMD 11-2-303.
2. Materials suspected of being ACM but not sampled will be assumed to contain asbestos and treated accordingly. This is most appropriate when the task is very limited in scope (e.g., small spill < 1 ft<sup>2</sup>, floor tiles < 10 ft<sup>2</sup>) and the cost and time spent collecting and analyzing the samples is a significant part of, or exceeds, the cost of performing work.

#### **I. Labeling and Posting**

1. Identified (by laboratory analysis) friable ACM found to contain 1.0 % asbestos or greater should be labeled, when feasible, as shown in Appendix A, Figure A-1.
2. Warning signs will be posted at the outside perimeter of each regulated area as shown in Appendix A, Figure A-2.

#### **J. Medical Surveillance**

Any LBNL employee identified as being exposed to airborne asbestos for a combined total of 30 or more days per year engaged in Class I, II and III work, or is exposed at or above a permissible exposure limit, will be provided medical surveillance as described in 29 CFR 1926.1101 or 29 CFR 1910.1001 by the Health Services Group.



#### **K. New Products Containing Asbestos**

*No new asbestos-containing construction products will be procured or installed at LBNL without prior review by the Industrial Hygiene Group.*

#### **L. Protective Clothing**

1. Employees who may be exposed to airborne asbestos levels exceeding the PEL or Excursion Limit will be provided protective clothing ( e.g., disposable coveralls, gloves, shoe coverings, safety glasses, etc.) and work equipment at no cost.
2. Contaminated clothing used in areas that may exceed the PEL or excursion limit, will be transported in sealed poly bags and disposed of as asbestos-containing waste.

#### **M. Regulatory Agency Notification**

*The BAAQMD requires a minimum of 10 working days notice prior to any building demolition. The same notification requirement applies to building renovations involving RACM removal over certain reportable quantities. An additional category of notification is for a series of small activities involving RACM which individually do not trigger notification, but collectively do. This is called a cumulative notification and it is submitted and paid for by the Facilities Division once per year.*

*The procedure at LBNL to ensure compliance with BAAQMD's notification requirements is as follows:*

*The Environmental Protection Group (EPG) will be informed of every demolition, whether or not it involves asbestos. Outside contractors who perform work reportable to BAAQMD (i.e., greater than 100 linear, 100 square or 35 cubic feet) will send BAAQMD the required notice.*

#### **N. Respirators**

1. Air-purifying negative pressure respirators used by LBNL personnel who may be exposed to asbestos above the PEL or excursion limit must be fit-tested prior to conducting asbestos work. This is in addition to the other aspects of the Respiratory Protection Program. Call extension 2826 for respirator fit testing and training.
2. Powered air purifying respirators shall be provided free of charge in lieu of a negative pressure respirator if an employee requests one.
3. Respirators shall be used in all of the following circumstances.
  - a. Class I asbestos work

- b. Class II work where the ACM is not removed intact.
  - c. Class II & III work where wet methods are not used and there is not a negative exposure assessment.
  - d. Class III work where TSI or surfacing material that contains or may contain asbestos is removed.
4. The following table will be used to select respiratory protection, and represent minimum requirements.

<u>Airborne Concentration of Asbestos</u>	<u>Required Respirator</u>
Not in excess of 1 f/cc (10X PEL)	Half-mask air purifying (not disposable) with HEPA filters.
Not in excess of 5 f/cc (50X PEL)	Full-face air purifying respirator with HEPA filters.
Not in excess of 10 f/cc (100X PEL)	Powered air purifying with HEPA filters.
Not in excess of 100 f/cc (1000X PEL)	Full face piece supplied air respirator operated in pressure demand mode.
Greater than 100 f/cc (1000X PEL)	Full face piece supplied air respirator in pressure demand, equipped with 5-minute escape bottle

**O. Roofing Products - Asphalt**

Asphalt roofing products containing asbestos are non-regulated (Category I, non-friable) unless they are or will become friable, or will be subjected to sanding, drilling, grinding, cutting, or abrading. Such non-regulated asphalt roofing products do not need to be reported prior to demolition or renovation activities unless they will become friable as part of the work. *Note: Waste Disposal sites may have individual internal requirements that exceed legal disposal requirements, be sure to contact the Waste Management Group for guidance concerning bins, labeling & wrapping requirements, etc., before starting work.*

**P. Sheetrock (drywall)**

When a demolition or renovation impacts a wall system composed of sheetrock, joint compound, and tape, a composite sample will be taken of the

wall material. A wall system shown by composite sampling to contain less than 1% asbestos is not regulated by BAAQMD, EPA, or DTSC, and may be disposed of as construction waste. If the composite sample result indicates a trace amount of asbestos, and/or the joint compound analysis indicates a 1% or greater asbestos content, an EH&S Industrial Hygienist must be contacted for further guidance before starting the work.

## Q. Training

1. *Facilities employees routinely engaged in activities that may contact, but not disturb, asbestos containing building materials, must attend an LBNL annual asbestos awareness class. Although not classified as class IV work, since dust, waste or debris from Class I-III work is not performed, the training will cover:*
  - a. *Examples of building materials that may contain asbestos.*
  - b. *The health effects associated with asbestos exposure.*
  - c. *The relationship between smoking and asbestos in causing cancer.*
  - d. *The nature of the operations that could result in asbestos exposure, as well as how to minimize exposure through the use of engineering controls, work practices, personal protective equipment, and administrative controls.*
  - e. *The relationship between friability and percent asbestos content and how it affects risk of exposure.*
  - f. *Spill response*
2. Employees identified as being potentially exposed to airborne asbestos levels above the PEL or excursion limit shall receive OSHA approved training (per 29 CFR 1910.1001 (j)(7) and 29 CFR 1926.1101 (k)(iii)).
3. Employees performing bulk sampling must attend an EPA-approved building inspector course or be a CIH (29 CFR 1926.1101 (k)(ii)(B)).
4. *The Asbestos Program Manager must attend EPA approved Building Inspector/Management Planner and Contractor/Supervisor courses, and maintain current certification.*
5. *The Industrial Hygienist whose specialty area is asbestos must attend EPA approved Building Inspector/Management Planner and Contractor/Supervisor courses, and maintain current certification.*

## X. Asbestos Removal and Repair Procedures

The presence and location of ACM or PACM must be identified at the worksite before work starts.

In addition, before any demolition, the Environmental Protection Group will be informed. *An outside contractor performing work that is reportable to the BAAQMD will submit the 10 day notification directly to the air district.* Large scale Class I and II work is rarely performed by LBNL employees. Occasional Class III work (and no Class IV work) is performed by LBNL Facilities AHERA/OSHA trained asbestos workers. No Class IV work is conducted at LBNL since LBNL employees trained at the awareness level don't clean up dust, waste and debris from Class I, II or III jobs.

All exposed RACM shall be adequately wetted and kept wet during cutting, stripping, demolition, renovation, removal, handling and disposal. Approval for dry removal of RACM must be received from the BAAQMD through the Environmental Protection Group.

### A. Class 1 Asbestos Work

1. **Definition:** Removal of thermal system insulation (TSI) or surfacing material greater than 1 glove bag. Note: Any change or deviation from the below specified control methods must be approved in writing by a CIH.
2. **Training:** Abatement workers will supervised by a "competent" person who meets the requirements of 29 CFR 1926.32(f). Workers must have AHERA worker (32 hours) training.
3. **Air Sampling:** Air monitoring required unless a negative exposure assessment has been performed for the entire operation. Clearance air sampling is required before negative pressure enclosure is removed and the work area is re-occupied. The acceptance clearance level is <70 structures/mm<sup>2</sup> by TEM. PCM clearance samples may be acceptable for small containments.
4. **Regulated Area:** Required for all work.
5. **PPE/Respirators:** Disposable coveralls, shoe covers and respirator. Respirators must always be worn, see respiratory selection table in section N for selection.
6. **Work Requirements:**
  - a. The work location will be identified as a "Regulated Area".

- b. HVAC system inside of the regulated area is isolated by sealing with a double layer of 6 mil plastic.
- c. Impermeable drop cloths will be placed on surface beneath all removal activity.
- d. *Appendix B (Job Audit Checklist) will be completed by a EH&S Industrial Hygienist or a Facilities Supervisor AHERA trained as a "competent" person, before work starts.*

## 7. Negative Pressure Enclosure

If the amount of ACM to be removed is more than 25 linear or 10 square feet, and exposure monitoring has shown that the PEL may be exceeded, a negative pressure enclosure is required. Listed below are the requirements for the enclosure.

- a. A minimum of -0.02 inches of water differential and at least 4 air changes per hour must be maintained inside of the enclosure.
- b. Negative pressure machines shall be exhausted to the outside of the building, if feasible.
- c. Full decontamination with an equipment room, shower area (with hot and cold water), and clean room in series, is required at the worksite. (29 CFR 1926.1101 (j)).

## 8. Glove bag Systems

Glove bags shall be used to remove ACM and PACM from straight runs of piping, specifications for the glove bags and their use are listed below:

- a. Made of 6 mil thick plastic and seamless at the bottom.
- b. Installed so that it completely covers the circumference of the pipe.
- c. Smoke tested for leaks and any leaks sealed prior to use.
- d. Used only once and not moved.
- e. Not used on surface exceeding 150o F.
- f. Collapsed by removing air with a HEPA vacuum prior to disposal.
- g. Loose and friable material adjacent to the glove bag shall be wrapped and sealed in two layers of 6 mil plastic, or otherwise rendered intact.

- h. At least two persons shall perform Class 1 glove bag removals. Note: This is required in 29CFR 1926.1101 (g)(9).

## B. Class II Asbestos Work

1. **Definition:** Removal of ACM other than TSI or Surfacing materials. Examples of this type of work include the removal of roofing, flooring, mastics, gaskets, transite, wallboard, etc.
2. **Training:** Abatement workers will supervised by a "competent" person who meets the requirements of 29 CFR 1926.32 (f). Workers must have AHERA worker (32 hours) training. If the workers will remove/disturb only one type of building material (e.g., roofing, flooring, transite) they can be trained at a Class IV level, with additional training on specific work practices and engineering controls. This course will include hands-on training and be at least 8 hours long.
3. **Air Sampling:** Required unless there is a negative exposure assessment. *Clearance air sampling may be required before the work area is occupied. The acceptance clearance level is <math><70</math> structures/mm<sup>2</sup> by TEM. PCM clearance samples may be acceptable for small containments.*
4. **PPE / Respirators:** Same as for Class 1 Work if the PEL is exceeded, wet methods are not used, or if the material is not removed substantially intact.
5. **Roofing** - Shall be removed following the work practices listed below:
  - a. Removed intact to the extent feasible.
  - b. Wet methods used when feasible.
  - c. Cutting machines misted continuously during use, unless a competent person determines misting decreases worker safety.
  - d. Loose dust left by sawing operations HEPA vacuumed immediately.
  - e. Unwrapped or unbagged roofing material immediately lowered to the ground via covered, dust-tight chute, crane, or hoist. Wrapped or bagged material lowered to the ground at the end of the work shift.
  - f. Roof level heating and ventilating air intake sources isolated by sealing and wrapping with 2 layers of 6-mil plastic or equivalent.
6. **Floor Tile Removal** - Shall be removed following the work practices listed below:

- a. Removing floor tile < 100 ft<sup>2</sup> (Contact Asbestos Program Manager at x4028)
- b. Removing floor tile > 100 ft<sup>2</sup>, *follow requirements for Class 1 work. However, section (7)(C) (i.e., shower/equipment room) may be omitted if a negative exposure assessment has shown that the work is less than the PEL. In addition, the following listed below apply:*
  1. Sanding of flooring, its backing, and the mastic is prohibited.
  2. Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) shall be used to clean floors.
  3. Resilient sheeting shall be removed by cutting while wetting, and wetting during delamination.
  4. All scraping of residual adhesive or backings shall be performed using wet methods.
  5. Dry sweeping and mechanical chipping are prohibited.
  6. When tiles are heated and removed intact, wetting may be omitted.
  7. Transite panels, siding or shingles (i.e., asbestos-cement products)

The following work practice shall be followed:

- a. Cutting, abrading, or breaking is prohibited; if this is not possible perform as Class 1 Asbestos Work. (Contact Asbestos Program Manager at x4028 for drilling transite).
- b. Each panel or shingle shall be sprayed with amended water prior to removal.
- c. Unwrapped or unbagged panels shall be lowered to the ground, or wrapped in plastic sheeting and lowered to the ground at the end of the project.

### C. Class III Asbestos Work

1. **Definition:** Repair and maintenance activities that disturb ACM (or PACM), includes TSI and surfacing material and the cleanup of ACM dust or debris. The amount disturbed must fit in one glove bag or waste bag less than 60" in width.

Examples include:

- Single glove bag removal of pipe insulation
  - Patching of pipe insulation (< 100 linear feet)
  - Decontamination of surfaces (spills etc.) < 25 square feet
  - Removal of one square foot or less of RACM, using a local HEPA exhaust ventilation and collection system.
2. **Training:** Supervisor and workers trained at the EPA 16-hour Operations & Maintenance level or higher.
  3. **Air Sampling:** Shall be performed as needed to document potential exposures.
  4. **Regulated Areas:** Not required, unless the PEL is exceeded or a negative exposure assessment has not been performed.
  5. **PPE / Respirators:** Required as for Class 1 work when TSI or surfacing material is disturbed, the PEL is exceeded, or when a negative exposure assessment has not been performed. See Respirator section for guidance in selecting a respirator.
  6. **Work requirements:**
    - a. Post signs in such a manner that unauthorized persons will avoid entering the asbestos work area. (See Appendix A, Figures A-2 and A-3)
    - b. Isolate the work area to the extent possible by closing doors, windows, or other openings.
    - c. Wear disposable coveralls, shoe covers and half-mask respirator with HEPA filters, as appropriate.
    - d. Lightly mist any loose asbestos or asbestos debris with an appropriate wetting agent. Pick up or vacuum (HEPA) up loose material or dust. Wet wipe hard surfaces after vacuuming. Note: The exposed hose end of the HEPA vacuum should be taped shut when the vacuum is not in use.
    - e. Cover surfaces under the area to be abated with a sheet of 6-mil thick plastic sheeting adequate to catch any debris.
    - f. Wet the material thoroughly before handling. For pipe insulation removal, use a glove bag.



- g. Local exhaust ventilation should be used when feasible.
- h. Whenever the work involves the disturbance of TSI or surfacing materials, impermeable plastic barriers, mini-enclosures or glove bags shall be used to isolate the work area.
- i. Use only hand tools to remove or repair material.
- j. Seal all exposed ACM surfaces with a coating of penetrating encapsulant and a layer of bridging encapsulant.
- k. *Vacuum off protective clothing, and dispose of as asbestos containing waste material. These materials should be double bagged in 6-mil plastic bags and labeled as shown in Appendix A, Fig. A-1. Rubber boots that are to be reused must be wet wiped after use. Respirators should be removed last, wet wiped, and placed in a storage bag. Filters should be removed from the respirator and disposed of, or the respirator filters air inlets should be sealed with tape, if left on the respirator, or stored in a separate storage bag. Dispose of the wet wipe material and the respirator filters as asbestos containing waste material.*
- l. *Clearance air-sampling is generally not required for work at this scale. Contractors performing this work will monitor their own workers. Removed ACM shall be disposed of in accordance with Section XI.*

#### D. Class IV Asbestos Work

1. **Definition:** Defined by OSHA as maintenance and custodial activities where employees contact ACM or PACM, but do not disturb the material and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.
2. **Training:** Since LBNL employees trained at this level do not clean up dust, waste or debris from Class I-III activities, training is limited to LBNL's awareness level training for hazard communication purposes.
3. **Air sampling:** Not applicable since employees are not disturbing ACM related to clean up of dust, waste and debris resulting from Class I-III work.
4. **Regulated Areas:** None. Employees who are trained at this level will not work in a regulated area.
5. **PPE / Respirators:** Not required. Employees who are trained at the LBNL awareness level will not work in Regulated Areas or perform work that disturbs ACM dust, waste or debris.

6. **Work requirements:** Wet methods. Since this type of work only involves contact with ACM flooring, see section VIII(F), "Flooring Material Maintenance".

## **XI. Waste Disposal**

### **A. Friable ACM containing 1% or greater asbestos (RACM).**

1. All RACM waste must be handled as hazardous waste. RACM will be thoroughly wetted before packaging, then packaged to prevent dispersion and to facilitate handling.
2. The Waste Management Group at extension 5867 or 5877 is responsible for determining the Hazardous Waste Handling Facility's storage and labeling requirements, selecting the disposal site, as well as manifesting and maintaining disposal records. They will also assist in determining how to best package the waste for disposal and arranging site pickup.
3. Packaging

Labels: All containers of RACM must bear the asbestos warning label (Appendix A, Fig. A-1) and the "Hazardous Waste" label.

Bags: Asbestos waste must be sealed inside two layers of 6-mil thickness plastic bags after thorough wetting. The excess air in the bag shall be removed by a HEPA vacuum. The outer bag must be labeled as shown in Appendix A, Fig A-1.

Drums: Wetted asbestos waste can be contained in properly labeled DOT spec. 17H 55-gal steel drums equipped with polyethylene drum liner bags.

### **B. Non-friable ACM (transite, floor tile, etc.)**

Contact the Waste Management Group for assistance with labeling, storage, and disposal requirements. Labels may not be necessary if non-friability can be demonstrated (29 CFR 1926.1101 (k)(7)(A)).

APPENDIX A

ASBESTOS LABELS AND SIGNS

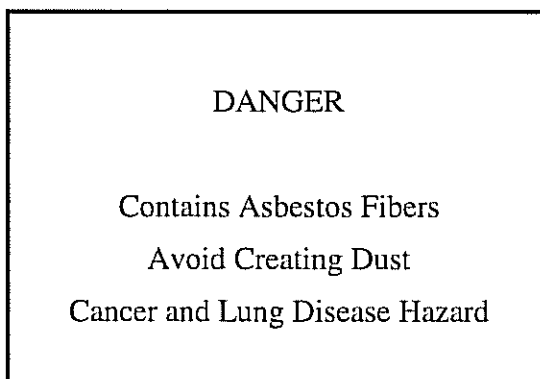


Figure A-1. Appropriate wording for labeling friable materials containing 1.0% asbestos by weight, or greater. This label is also appropriate for containers (including waste containers) that contain 1.0% or greater friable asbestos by weight. Waste containers holding RACM and asbestos contaminated materials (such as protective equipment and clothing) must also include a label with the generator name and location, and a hazardous waste label.

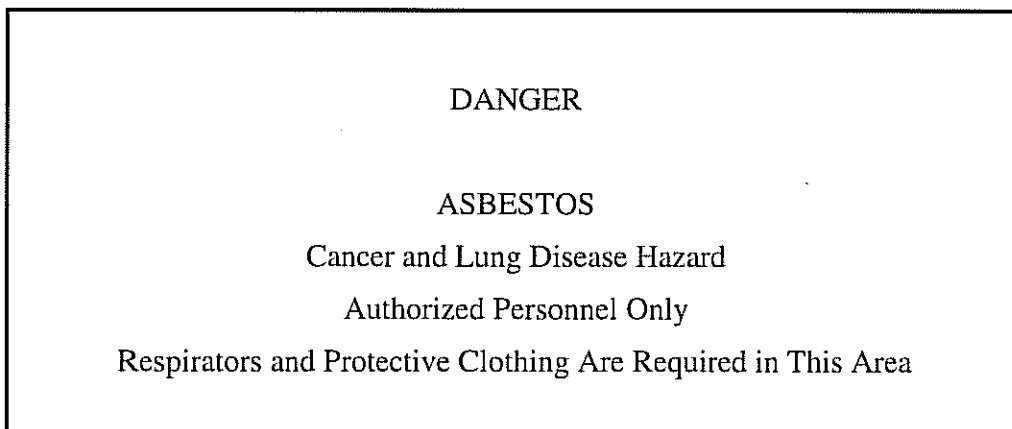


Figure A-2. Appropriate wording for warning sign to demarcate areas where the PEL or excursion limit may be exceeded due to asbestos handling or the presence of damaged, friable ACM in need of repair.

APPENDIX A (continued)

ASBESTOS LABELS AND SIGNS

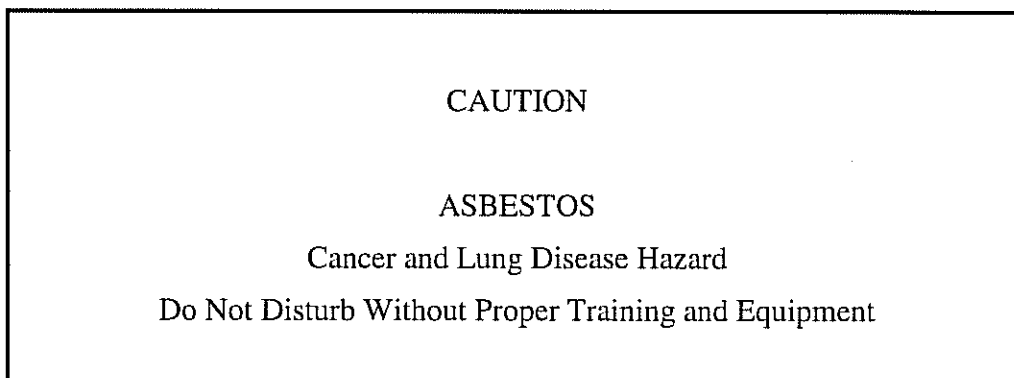


Figure A-3. Appropriate wording for warning sign where there is the potential for employees to come into contact with, release, or disturb, asbestos or asbestos-containing construction materials.

APPENDIX B

CHECKLIST FOR AUDITING ASBESTOS WORK PRACTICES

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_

Asbestos Task(s): \_\_\_\_\_

Building: \_\_\_\_\_ Room: \_\_\_\_\_ Contractor: \_\_\_\_\_

LBNL Project Manager: \_\_\_\_\_

LBNL Superintendent: \_\_\_\_\_

LBNL IH: \_\_\_\_\_

S = Satisfactory    US = Unsatisfactory    NI = Needs Improvement    NA = Not Applicable

WORK AREA

\_\_\_\_\_    Uncovered asbestos kept wet with water or with other encapsulating type spray while it is being worked on.

\_\_\_\_\_    Containment system suitable for the scope of work.

\_\_\_\_\_    Building HVAC system isolated from work area.

\_\_\_\_\_    All electrical equipment GFCI protected.

\_\_\_\_\_    Construction of containment substantial enough so that integrity is not likely to be breached throughout the duration of the job.

\_\_\_\_\_    Negative pressure 0.02 inches of water or greater achieved. (i.e., static pressure gauge reading and evidence of plastic sheeting pulled in).

\_\_\_\_\_    Perform smoke tube test of NPE and glove bag using non irritating tubes?

\_\_\_\_\_    Manometer used to measure negative pressure installed, properly zeroed, works and will provide a useful print out. Keep copy of print out for our building file.

\_\_\_\_\_    Entrances posted with "Danger Asbestos" signs, access restricted by barricade tape and or other means.

\_\_\_\_\_ *Coordinate with night shift PMTs to check integrity of containment throughout the night shift or weekend / holidays. Give them your pager, cell, home contact info in case of emergency.*

\_\_\_\_\_ *For RACM, BAAQMD notification in place and a copy obtained for our records?*

\_\_\_\_\_ *For small RACM jobs (<100 sq. or linear feet) remember to obtain copy of subcontractor's cost proposal that describes the type and amount of RACM to be removed for our annual cumulative BAAQMD notification purposes and file with asbestos program manager separately and place in building file.*

\_\_\_\_\_ *Negative air machines and vacuums tested and copy of documentation obtained for our records.*

\_\_\_\_\_ *Building manager notified of the work and the building entrances and immediate work area posted with asbestos work notification? Keep copy of posting for our building file.*

\_\_\_\_\_ *Site specific work plan written, approved and a copy obtained for our building file?*

\_\_\_\_\_ *Glove bag jobs performed inside a NPE?*

#### AIR SAMPLING

\_\_\_\_\_ *Representative personal exposure monitoring of employees performing abatement?*

\_\_\_\_\_ *Personal air sampling pumps on, calibrated before and after use, times recorded?*

\_\_\_\_\_ *Equipment removed from the containment before clearance samples collected?*

\_\_\_\_\_ *Remind subcontractor to turn in two blanks.*

#### RESPIRATORY PROTECTION

\_\_\_\_\_ *Respiratory protection adequate (half-mask respirators with HEPA cartridges for most jobs except TSI and surfacing material or work performed by contractors we are not familiar with) for the type of work?*

\_\_\_\_\_ *Employees trained and fit tested to wear respiratory protective equipment?*

\_\_\_\_\_ *Documentation of fit-test and medical approval at the worksite and copies obtained for our records?*

PROTECTIVE WORK CLOTHING AND EQUIPMENT

- \_\_\_\_\_ *Protective clothing, such as disposable head covering, foot covering, coveralls used in the regulated area?*
- \_\_\_\_\_ *Contaminated clothing placed in labeled asbestos disposal bags?*
- \_\_\_\_\_ *Decontamination facilities (e.g., hand washing, showers) adequate for the scope of work*

TRAINING

- \_\_\_\_\_ *Are employees properly trained for the type of work they are performing, as specified by OSHA?*
- \_\_\_\_\_ *Documentation of AHERA training at the worksite and copies obtained for our records?*
- \_\_\_\_\_ *Is there an AHERA contractor/supervisor onsite (FULL TIME)?*
- \_\_\_\_\_ *Employees all have GERT training? (Need to check training database or preferably they will provide a copy record w/ other submittals)*

ASBESTOS WASTE

- \_\_\_\_\_ *Waste Management notified of the project?*
- \_\_\_\_\_ *Loose asbestos kept wet and cleaned up as soon as possible? All material must be cleaned-up by the end of each work shift.*
- \_\_\_\_\_ *Waste and asbestos contaminated materials collected, kept wet, and placed in properly labeled 6-mil plastic bags or hazardous waste containers?*
- \_\_\_\_\_ *Waste bags and containers removed from containment before clearance sample collected?*

COMMENTS

---

---

---

---

APPENDIX C - ACM DAMAGE CATEGORIES & CORRECTIVE ACTION

ACM RECOMMENDATION CATEGORIES AND CORRECTIVE ACTION:					
SUMMARY OF OPTIONS <sup>a</sup>					
DAMAGE CATEGORY	OPTIONS				
	I. PREVENTATIVE (O&M PROGRAM) <sup>e</sup>	II. REPAIR and O&M <sup>d</sup>	III. ENCAPSULATE <sup>b</sup> and O&M <sup>d</sup>	IV. ENCLOSE <sup>c</sup> and O&M <sup>d</sup>	V. REMOVE
•Significantly Damaged <sup>f</sup>				X or	X
•Damaged <sup>g</sup>		X or	X or	X or	X
•Slightly Damaged/Aged <sup>h</sup>		X or	X or	X or	X
•Not Damaged/Aged <sup>e</sup>	X		X or	X or	X



- a The Asbestos Inspector, Building Manager, or Asbestos Program Manager shall make recommendations from the response options listed above only after an Inspection/Reinsertion or Periodic Surveillance.*
- b Apply encapsulant.*
- c Enclose (isolate) the space only where necessary to protect human health and environment.*
- d Operations and Maintenance (O&M) Program if ACM is not removed, which will include inspection, labeling, preventative maintenance, and other appropriate controls.*
- e An O&M Program, alone, is appropriate if no corrective action is warranted. The recommendation to correct ACM that is not damaged includes an assessment of the "potential" for future damage/disturbance.*
- f Corrective action immediately (<1 day) or seal off the area if friable, if non-friable type of material contact an Industrial Hygienist (IH) to determine the appropriate repair schedule.*
- g Corrective action ASAP (within 5 days) if friable, if non-friable type of material contact an IH to determine the appropriate repair schedule.*
- h Corrective action within 30 days if friable, if non-friable type of material contact an IH to determine the appropriate repair schedule.*