17 Asbestos Safety

The following pages contain the complete University of Montana-Missoula Asbestos Operation and Maintenance Plan prepared and updated by the Facilities Services Department (FS), last updated on January 23, 2009. An electronic version is available on either the FS’s website or see http://www.umt.edu/facilities/BuildingMaintenance/Asbestos%20Information.aspx
The University of Montana
Safety Manual - Chapter 17

Last update: Revised January 23, 2009 – Environmental Health & Risk Management

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Revised - Jan. 23, 2009
A. Information on Asbestos

For specific building information about known asbestos and restricted areas see the Facilities Services web site at: http://www.facps.montana.edu/facilities

1. WHAT IS ASBESTOS

Asbestos is a mineral that is mined from the earth. There are several kinds of asbestos. All types of asbestos tend to break into very tiny fibers, many of which are not visible without a microscope. Asbestos is resistant to fire and has high tensile strength.

2. ARE ANY TYPES OF ASBESTOS SAFE

No. Asbestos-related disease can be caused by all types of asbestos. However, chrysotile appears to require a higher exposure to cause disease than other types of asbestos. Nearly all of the asbestos at the University of Montana-Missoula is chrysotile.

3. WHERE HAS ASBESTOS BEEN USED

Asbestos has been used in approximately 3,000 different products. The amount of asbestos in asbestos-containing materials varies from less than 1% to 100%. Examples of products that might contain asbestos are:

- Thermal System Insulation (TSI) (e.g., pipe insulation)
- Surfacing material on walls or ceilings
- Textured surfacing material
- Acoustical material
- Transite panels (e.g., garage door panels, fume hood walls, fire walls, etc.)
- Electrical insulation
- Fireproofing material
- Fire-protective clothing
- Fire-rated asbestos core doors
- Fire-stop material and fire-resistant drywall
- Thermal laboratory gloves
- Floor tile (especially 9 inch tile) and tile mastic
- Vinyl sheet flooring
- Personal hair dryers (insulating material)
- Heating pads
- Siding, Roofing Paper, Shingles and Adhesives
- Theatrical lamps (insulation)
- Theatrical (fire) curtains
- Brake pads 1 Clutch disks
- Roofing shingles and adhesives
- Some ceiling tiles
- Some plasters
- Some cements
- Some spackling compounds
- Asbestos cement pipe
Asbestos containing material (ACM) is dangerous if the asbestos fibers can be released. Once they are floating freely in the air, asbestos fibers can be inhaled and cause disease. Some ACM can easily be crumbled by hand pressure. This soft or loosely-bound material is called friable asbestos. Friable ACM is the greatest health concern because it can easily release fibers. Examples of friable asbestos-containing materials are fireproofing on structural beams, sprayed-on asbestos ceiling insulation and troweled-on acoustical insulation. Hard asbestos-containing material, such as vinyl floor tile, in which asbestos fibers are firmly bound or encased, does not generally create exposure problems. However, even non-friable ACM can release fibers and present a hazard if it is sanded, cut, ground or disturbed in some other way. Therefore, any material that contains asbestos has the potential to release fibers and become hazardous.

4. HOW DO I KNOW IF A PRODUCT CONTAINS ASBESTOS?

You cannot tell whether a material contains asbestos by looking at it. The only way to know if a product contains asbestos is to send a piece of the suspect material to a qualified laboratory. This is called a bulk sample. Only certain kinds of microscopes can be used to analyze the sample, polarizing light microscope or an electron microscope. Until you can prove whether or not a product does contain asbestos, be on the safe side and treat it as though it were asbestos.

5. HOW DOES ASBESTOS ENTER THE BODY?

The most common way for asbestos to enter the body is through breathing. Larger fibers usually get trapped in the nose hairs or in the mucus along the breathing passageways. However, some asbestos fibers are so small that they can bypass this body defense mechanism and get deep into the lungs. Asbestos can also enter the digestive tract when you eat or smoke in a contaminated area. Asbestos does not pass through the skin.

6. WHAT ARE THE HEALTH EFFECTS OF ASBESTOS EXPOSURE?

Scientists around the world have demonstrated the links between exposure to asbestos and four serious diseases: lung cancer, mesothelioma, digestive system cancer, and asbestosis.

   a. LUNG CANCER
   Asbestos-exposed people are about 5 times more likely to develop lung cancer than non-exposed people. Asbestos and cigarettes are a particularly deadly combination. If a person exposed to asbestos also smokes, his or her chance of getting lung cancer increases dramatically to 50 times that of a non-smoking, non-asbestos exposed person. If you have been exposed to asbestos, the first thing you should do to decrease your risk of getting lung cancer is stop smoking.

   b. MESOTHELIOMA
   Mesothelioma is a cancer of the lining of the lungs or of the abdominal cavity. This is a very rare cancer that is almost always associated with asbestos exposure. Mesothelioma has become a major public health concern because this disease can occur after very brief or very low exposures to asbestos. Cases of mesothelioma have occurred in spouses and children of asbestos workers whose only exposures were from the dust brought home on the clothing of family members who worked with asbestos in high exposure settings.

   c. DIGESTIVE SYSTEM CANCERS
   Increases in stomach, colon, rectal and other digestive system cancers have been observed in asbestos exposed workers.
d. ASBESTOSIS
Asbestosis is a scarring of the lung tissue that can lead to shortness of breath. A person with a severe case of asbestosis can barely get enough oxygen to walk. Sometimes the scarring may spread so far through the lungs that it causes death. These severe cases are usually caused by extremely high exposures and are very rarely seen under current working conditions.

7. WILL I KNOW I’M GETTING SICK FROM ASBESTOS?

No. Asbestos does not cause any immediate effects, such as coughing or itching. The diseases caused by asbestos do not appear until 15 to 40 years after your first exposure. This is called the latency period. Even if you feel healthy while you are working with asbestos, you may get sick many years later.

8. CAN I GET SICK FROM ASBESTOS IF I’M NOT AN ASBESTOS WORKER?

Yes. Workers who did not work directly with asbestos, but whose jobs were located near highly contaminated areas, have developed asbestos-related diseases.

9. IF I’VE ALREADY BEEN EXPOSED, WHY SHOULD I TAKE PRECAUTIONS?

The more you are exposed, the more likely you are to develop asbestos-related disease. In addition, the more exposure you have, the sooner you will become sick. You should act to prevent further exposures so that your chances of developing asbestos-related disease will remain small.

10. IF I’VE BEEN EXPOSED, IS THERE A MEDICAL TEST THAT I SHOULD TAKE?

If you are about to begin working with asbestos, or if your job periodically or regularly exposes you to asbestos, you should see a doctor who is knowledgeable about asbestos disease. (Your regular doctor is not likely to know about asbestos-related conditions.) The examination should include, at a minimum: - a work history - a medical history - a chest x-ray - a breathing test. Remember, the signs of asbestos disease usually do not appear for 15 to 40 years after exposure first occurs. However, if you do get sick years later and want to seek compensation, a baseline examination now will document your health status and help doctors relate future changes in your health to your asbestos exposure. Once you are exposed, you should see your doctor regularly. Regular medical exams are important because the chances of curing certain cancers are much greater when detected early.

11. WHY IS PREVENTION OF ASBESTOS EXPOSURE SO IMPORTANT?

Asbestos fibers remain in the lungs. The body cannot break down these fibers. Each exposure adds to the body burden from the previous exposure. Asbestos disease can progress even after you are no longer exposed. Asbestos fibers remain in the lung for life. As long as the fibers stay in your body, you are at risk for developing lung disease. This underscores why you must prevent exposure to asbestos in the first place: you cannot turn back the clock.

Asbestos-related diseases are rarely curable. Once these diseases are detected, there is usually little that can be done to change the course of the disease.

12. ARE THERE LAWS THAT WILL PROTECT ME FROM ASBESTOS?

Yes. There are asbestos laws that offer protection for workers and the general public. The following regulations have been put in place to protect people from asbestos:
1. Montana Code Annotated (MCA) Title 75 chapter 2 part 5 Asbestos Control Act.
3. EPA NESHAP 40 CFR part 61 subparts A & M.
5. Missoula asbestos ordinance.

13. ARE THERE SAFE SUBSTITUTES FOR ASBESTOS?

Products like fiberglass and mineral wool are being used as substitutes or replacements for asbestos, but they are not safe substitutes. The few studies that have been done on these products so far indicate that glass fibers and non-asbestos mineral fibers (which are shaped similarly to asbestos fibers) may cause the same kind of lung scarring and cancers as asbestos. Therefore, until we learn more about the health hazards of these substances, you should limit exposure to fiberglass and rock wool by using a fitted respirator with a HEPA filter.

This document was excerpted largely from a fact sheet produced under a grant from the Public Welfare Foundation, and was funded in part by the New York State Department of Labor Occupational Safety and Health Training and Education Program. New York Committee for Occupational Safety and Health (NYCOSH) 275 Seventh Avenue New York, NY 10008 (212) 627-9300.

B. Asbestos Management Plan

1. ASBESTOS MANAGEMENT:

The University of Montana (University) follows a practice endorsed by the U.S. EPA known as: management (of asbestos) in place. The goal is to maintain existing asbestos containing material (ACM) in a stable condition rather than removal of asbestos for the sake of removing asbestos. The mere presence of asbestos does not constitute a hazard. If the ACM is maintained and undisturbed there is no exposure or risk to a building’s occupants. Exposure can occur when the ACM is abraded or otherwise disturbed during maintenance operations, remodeling, abuse, or some other activity.

OSHA categorizes abatement projects into four (4) classes:
Class I: The most potentially hazardous class of abatement. The removal of thermal system insulation (TSI) and sprayed-on or troweled on surfacing material are examples of Class I activities. Most Class I projects are not completed in a single day.
Class II: The removal of other types of ACM other than TSI or surfacing material. Examples of Class II work include floor tile removal and roofing projects.
Class III: Repair and maintenance operations that are small-scale and short duration.
Class IV: Projects were formerly referred to as Operations and Maintenance (O&M) activities. Generally, Class III Projects are completed in less than one day.
Class IV: Clean-up of ACM waste and debris, or routine cleaning activities involving ACM. Dusting contaminated surfaces, mopping, or other floor care, and cleaning up asbestos-containing materials from thermal system insulation (TSI) are included in Class IV activities.

All abatement categories have specialized training requirements.
Asbestos abatement is a routine occurrence in a facility the magnitude and complexity of UM.

2. ASBESTOS-CONTAINING MATERIALS AT THE UNIVERSITY

Asbestos is a stringently regulated hazardous material. There are at least four aspects that must be considered
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if asbestos is encountered or suspected in a project: mitigation of environmental contamination; protection of adjacent work-sites and workers; worker safety while handling asbestos and proper waste disposal.

3. REQUIREMENTS

The design team for University and/or the Montana Department of Architecture and Engineering (State A/E) projects must include an environmental consultant to survey all areas impacted by construction for asbestos containing material and develop a plan for removal and waste disposal for all Class 1 and Class 2 projects.

Missoula County Asbestos Ordinance – Any plans/permits submitted or applied for after March 11, 2008 to demolish, repair, alter, renovate, remodel, lift, burn or move any building/structure that falls within the category listed above will require a letter from an accredited asbestos inspector stating that: 1) the asbestos survey is complete and 2) that a copy has been sent to the State Department of Environmental Quality. A separate letter also needs to be submitted which has been signed by the contractor and owner stating that they are aware of the asbestos survey contents. These letters need to be given to the Building Department before a permit/plan will be issued.

The University does not allow asbestos containing materials to be used in new construction/renovation projects. This can be especially challenging if building materials are being obtained from markets outside the United States.

The policy of the University is to engage a license abatement contractor for removal of asbestos and other hazardous materials from the work site on any renovation or construction project prior to the general contractor commencing work. The limits of removal will be specified by the project consultant and documented in the contract documents. The general contractor shall not work outside these limits without prior written approval from the owner. If the contractor identifies or suspects any asbestos or other hazardous materials within the limits of construction, he shall immediately stop work and notify the owner. The owner shall engage a licensed contractor to remove the material before proceeding. Any delays caused by the work stoppage shall be added to the completion time of the contract.

The University will include in the construction documents, a section addressing asbestos and other known hazardous materials. This section will include a good faith survey of known hazardous materials in the building. This document is not guaranteed to be all-inclusive. The general contractor is required to protect all of his workers and or subs workers on the project in accordance with all current pertinent requirements. If the general contractor or any of his subs intentionally or unintentionally disturbs hazardous materials in the work site, the contractor is liable for all associated liabilities and claims.

An asbestos inspection of the project worksite must be conducted by an asbestos inspector who is accredited by the state of Montana DEQ. The University must provide a written inspection report to all contractors submitting a bid to undertake any construction, renovation, remodeling, maintenance, repair, or demolition projects before a bid is submitted. Failure to comply with these requirements may subject the University to mandatory fines and construction delays. Don’t assume that new buildings, including buildings constructed in the 1990s, are asbestos free.

A copy of the survey must be posted at the project site during construction.

A copy of the inspection report, or executive summary of findings and appropriate portions of the survey, must be included in the contract documents and posted at the project site. It is possible to encounter hidden asbestos containing materials that were not discovered in the good faith survey. If materials suspected of
being asbestos-containing are encountered during construction activities, the construction renovation contractor must immediately stop work and contact the Project Manager or the Construction Coordinator. Work must remain stopped, and the suspected material, remain undisturbed until identification and necessary abatement are accomplished. UM building coordinators and or relevant deans, chairs and directors must be notified of all proposed asbestos abatement activities to be conducted within their assigned building(s).

Designated representatives from Facilities Services, Environmental Health and Risk Management, or the asbestos consultant may stop abatement or construction work at any time if unplanned asbestos disturbance is found.

In the event asbestos is disturbed as a result of a contractor’s actions, the contractor shall assume full and ultimate responsibility for all associated costs.

4. SPECIAL CONSIDERATIONS IN THE CHARLES H. CLAPP BUILDING (SCIENCE COMPLEX)

Work above the ceiling on the third and fourth floors may be done with no special precautions because the asbestos has been removed. Work above the ceiling tile on all other floors must assume that asbestos is present on the ceiling tile and above.

A qualified asbestos worker familiar with the ACM locations in the building will inspect and clean the ceiling tiles and areas above unmarked ceiling areas prior to entry and work by any crafts or trades. All work outside of known clean areas will be accomplished in negative containment with PPE and respiratory protection or held until the area is abated.

5. CONTACTS

Contact Greg Plantz or Maintenance Superintendent for access above ceilings in the basement, first and second floors.

When responding to an emergency in the building, take PPE and your HEPA cartridge fitted respirator with you. Go bags complete with tyvek suits, your personal respirator and gloves must accompany you when responding. If emergency ceiling access is necessary, close off the room or area to unprotected occupants and wear protective equipment to enter ceiling space. Maintain area or room closure until it has been inspected and cleaned by a qualified asbestos worker. Equipment used in the clean-up will be cleaned or disposed of by Technical Services.

Most often asbestos is removed during maintenance activities, or during remodeling projects. The majority of projects at UM are regarded as Class III.

During larger projects or projects of greater complexity, negative pressure enclosures are constructed to prevent the release of any asbestos fibers into the occupied areas of the building. All asbestos abatement projects are clearly labeled to indicate to the campus community that such work is ongoing.

Awareness training is required for Class IV work. Repair and maintenance training is required for Class III work. Additional training and certification is required for Class I or Class II work.

Only wet methods or a HEPA filtered vacuum may be used for asbestos clean up activities. Respiratory protection is required when working with asbestos. Keeping a material wet ensures that the asbestos does not
become airborne. Preventing the material from becoming a dust is the critical exposure control measure. According to the asbestos ARM 17.74.359 Annual Asbestos Project Permits, section (3), an owner or operator conducting asbestos projects under an annual permit shall comply with all requirements pertaining to asbestos project notification. A Class III, or small scale-short duration maintenance project, is generally defined as being no more than 3 linear feet of TSL, or 3 square feet of ACM (e.g., floor tile). Other examples include: amounts that can be removed in a single, small glovebag; removing a gasket on a valve; drilling or cutting a hole into a wall coated with asbestos; or minor repairs to damaged ACM. More extensive projects are not considered Class III.

ACM waste must be properly disposed. Abatement Contractors of Montana, our annual permit contractor, will dispose of all ACM waste. Call 243-6050 for additional information on legal waste disposal procedures and methods.

The rules regarding asbestos can appear complicated and burdensome. With your assistance this work can be done safely and with minimal disruption.

6. HEALTH SCIENCE AND OTHER ACM CONTAINING BUILDING SPECIAL CONDITIONS

Asbestos is located in the Health Sciences Building in several materials:

1. Sprayed on cement plaster ceiling texture and associated overspray.
2. Transite board on interior walls and the interior of fume hoods.
3. Liners of high temperature ovens and incubators
4. Pipe insulation and cast fitting.
5. Floor tile.

Much of these asbestos containing materials (ACM) is painted, covered, or by nature is not friable. Care must be taken when working in the building to not cut, drill, scrape or abrade these materials and release asbestos into the air. Contact Facility Services for inspection and abatement where needed.

7. STANDARD WET METHOD FOR WALL PENETRATIONS

As a result of construction material asbestos survey results indicating that some buildings on campus have asbestos containing sheetrock joint compound and skim coats, a standardized wet method needs to be developed to control potential occupational asbestos exposures which may result from maintenance activities involving minor penetrations of walls. Possible exposures may result from employees making penetrations through asbestos contaminated wall surfaces for the purposes of installing screws and/or wall anchors.

Construction materials sampling of all wall surfaces prior to release of work is ill advised due to the nature and extent of damage to wall surfaces due to the sampling protocol. Damage due to sampling damage will exceed the potential damage of the screw and/or anchor installation itself.

Therefore, a safe method of achieving necessary wall penetrations without causing unwanted employee exposures to asbestos needs to be established. The method should incorporate work procedures that control fiber releases.

One example would be to use a damp sponge or wet paper towel when making the wall penetrate. The damp sponge or wet paper towel should be placed directly on the wall surface at the point of penetration, and the penetration made through both the sponge or paper towel and the wall. The penetration tool (drill bit, screw driver, knife, etc.) should then be withdrawn through the sponge or paper towel while hand pressure is applied to the tool
through the sponge or paper towel, thus wiping off possible asbestos contamination following the penetration. Following extraction of the penetration tool the sponge or paper towel should be used to wipe the wall surface of any remaining debris. The sponge or paper towel should then be placed into a small plastic bag and sealed. This work will be done with the help of an asbestos qualified person from the Technical Service Shop.

8. FLOODING

In the event of a flood in the building, the water may wash across or through the ACM and carry asbestos fiber with it to other locations. While the materials are wet there is no danger they will become air born. The following procedures will be used to insure worker safety.

a. All clean up workers will have asbestos awareness training for Class 4 cleanup.

b. Call the work order desk and request an asbestos competent person respond to the site to assess the hazards.

c. Use disposable gloves and overshoes while cleaning up the water. Clean up water with wet vacs, mops, rags and paper towels as needed. Dispose of mop heads, rags and paper towels and PPE in plastic bags. Seal the bags and leave for asbestos waste disposal. Empty water from wet vac and deliver machine to Technical Services for cleaning.

d. Where materials have splashed and dried or there is heavy contamination, seal off the room to entry by all people. Additional cleanup will be accomplished by asbestos abatement workers.

9. WORK IN TUNNELS

The majority of the tunnel system has had the asbestos removed. The exceptions are the tunnels at the Corbin/Brantly area. All expansion joints should be considered to have asbestos gaskets. When working in the tunnels if any questionable material is found, check with the asbestos inspector before doing any work.

C. Asbestos Sampling and Analysis Protocol Overview

Asbestos Containing Materials (ACM) are prevalent in buildings throughout the University of Montana (UM) Missoula campus. Typically, ACM is found in fireproofing, acoustical and decorative ceiling and wall plaster, and thermal pipe and tank insulation. ACM is also found in such materials as plaster walls, ceiling and floor tiles, roof felts, insulation, chemical hoods, oven gaskets, automobile brakes and clutches, and many other items. Because of the significant amount of asbestos (both friable and non-friable) within UM buildings, it is imperative that a coordinated program be in place for identifying ACM, notifying building occupants of its presence and location, and developing procedures to minimize disturbance of asbestos and possible exposure be developed. This section describes the University of Montana Missoula program for identifying and characterizing the condition of asbestos in buildings.

D. System-wide Surveys

To date, one (1) system-wide asbestos survey has been accomplished for the UM System. Facilities Services contracted and performed the initial survey in 1984. A copy of the survey report is located at the TS office.
1. Scope

The scope of the survey was as follows: Locate all suspected friable asbestos containing building materials (ACBM).

Sample all suspected materials and analyze them using Polarized Light Microscopy (PLM).

Characterize the condition of the asbestos based upon a modified EPA algorithm developed by the consultants.

Assign a hazard ranking category and number to each sample location that tested positive for asbestos.

Develop abatement cost estimates for all asbestos locations.

Cost estimates included asbestos abatement, development of abatement specifications, project monitoring and restoration. However, restoration costs were not included for all locations that were needed.

Develop guidelines for an asbestos operation and maintenance program.

2. Campus Survey and Inspection Program

a. Periodic Surveillance of Friable ACM

In order to prevent exposure of building occupants to asbestos fibers periodic surveillance of known locations of friable ACM will be performed by Facilities Services personnel. Periodic surveillance allows for an evaluation of the condition of the asbestos to determine if deterioration has occurred. If deterioration of the ACM has occurred which increases the potential for exposure of building occupants to asbestos, the following steps will be taken by the Facilities Services resources.

Contact the Technical Services Supervisor in Facilities Services and inform that person of the situation.

b. Identification of Non-Friable ACM

The system-wide asbestos survey did not sample for the presence of non-friable ACM such as vinyl asbestos floor tiles, roofing felts, packings, gaskets, resilient floor covering – including sheet vinyl goods, mastics, asphalt, roofing products, cement asbestos materials, putties, glazings, adhesives, cements and other asbestos containing materials that cannot be rendered regulated ACM under hand pressure. Building materials are sampled and analyzed prior to the start of construction or maintenance activities.

c. Survey

All work orders are routed through Facilities Services. Technical Services (TS) will assess the potential for asbestos hazards. This may involve the sampling and analysis of suspected asbestos containing building materials. The proposed work shall not commence until Facilities Services has completed the assessment and approved the work order. The work order is then sent forward with any comments relating to asbestos control. This survey inspection shall be done according to Section 3 of the Montana Asbestos Work Procedures Manual.

Only Facilities Services staff that are trained and certified as an Asbestos Inspector shall perform asbestos sampling.
d. Bulk Materials Sampling and Analysis
Asbestos containing material will not be sampled dry. A surfactant and water mixture should always be applied to the sample area first. For core samples a wet sponge technique will be utilized. The following steps are followed when sampling bulk material:

The immediate area is secured so those building occupants are not present. Every attempt will be made to perform sampling after business hours.

*A respirator with HEPA filters shall be donned prior to taking a sample*

Wet the surface of the sample area with a surfactant (typically 50% polyethylene glycol) or water. For core sampling, a wet sponge can be placed over the sampled area and the core will be run through the sponge into the suspected ACM.

Penetrate the suspected material completely with a sharp object such as a coring tool, blade or knife and remove a small sample of the suspect material.

Place the sample in a small glass vial or bag and seal it. Patch or repair the material where the sample was removed. Label the vial and record the following information:

- Date
- Location of sample
- Type of material (e.g. plaster wall, pipe insulation)
- Name of individual taking sample
- Laboratory that will be analyzing sample and phone number
- Sample result (to be filled in after analysis)
- Submit the sample to an approved laboratory for analysis

Depending upon the quantifying limit needed, the sample should be analyzed by:

- Polarized Light Microscopy (PLM) for quantifying limits equal to or < 1% asbestos by weight.
- Transmission Electron Microscopy (TEM) will be used when required by the Physical Plant Director.

e. Quality Assurance (QA)
Appropriate analytical Quality Assurance procedures must be established and followed by the analytical contractor. It is the responsibility of Facilities Services to ensure that appropriate QA requirements are provided to Purchasing and Contracts for inclusion in bid specifications.

3. Air Sampling Methods:
Air sampling is conducted before and during abatement, to monitor workers' exposure, and to ensure that the site has been adequately cleaned (post-abatement, or clearance monitoring). Two methods are used to analyze air samples: Phase Contrast Microscopy (PCM) and Transmission Electron Microscopy (TEM):

a. PCM: The advantages of PCM are the inexpensive cost (often <$20 per sample), the wide-spread availability, the minimal sample preparation, and quick results. PCM is also the OSHA analytical
method. The disadvantages are that it is not asbestos specific and fibers smaller than a given size are not counted.

b. TEM: Unlike PCM, TEM is specific for asbestos and even the smallest of fibers are counted. The disadvantages are the expensive costs (often $100,000 per sample) and slow turnaround times.

The clearance level for PCM analysis is 0.01 fibers/cubic centimeter of air (1/cc). Levels above this indicate the need for further cleaning or analysis with TEM to confirm the presence of asbestos fibers opposed to non-asbestos fibers present on the sample. Clearance levels for TEM analysis are less than 70 structures per square centimeter of filter area. The current OSHA Permissible Exposure Limit (PEL-TWA) for asbestos is 0.1/ccc for an 8-hour day.

NIOSH has not established an exposure limit for asbestos, since NIOSH has not identified thresholds for carcinogens that will protect 100% of the population. NIOSH recommends that occupational exposure to carcinogens, including asbestos fibers, be limited to the lowest feasible concentration.

Maintenance and trades workers who will be working in areas known to contain friable asbestos (nearly all University buildings constructed prior to 1972) shall:

Identify any asbestos that is close to the area of work;

If there is any chance of contacting the asbestos as part of the job i.e., hitting it with a pipe, backing into it while changing a valve, or otherwise disturbing it, the individual shall contact Technical Services.

HEPA respirators and tyvek suits shall be worn in areas like those above the ceilings in the Science Complex.

TS will assess the situation and if they decide it is necessary, will erect a small enclosure that will isolate the work area from other occupied space in the room or hallway. Air monitoring may be done if asbestos is actually disturbed but will not be required if none is contacted in the course of work. Labs, offices or other occupied space will be vacated if a portable enclosure is not erected. The enclosure is intended to provide a barrier between potentially disturbed asbestos and occupied space. In the event a substantial amount of asbestos is disturbed, the worker shall immediately request TS to assist in decontamination. Other crafts shall defer to recommendations made by TS on safe procedures to follow when incidental contact with asbestos is possible.

4. Training and Qualifications

a. Inspector Training. Any persons engaged in the inspection of a facility for ACM shall have successfully completed a DEQ approved 3-day inspector course of study.

b. Asbestos Maintenance Personnel Training and Qualifications. Any person that is required to work with friable ACM during their normal duties must be properly trained and protected. As a minimum, this training entails:

Successful completion of a 2 day EPA approved training course for maintenance personnel; and OSHA class III and IV operators;

Enrollment in a program of medical surveillance;
Being properly fitted and instructed in the use and care of respiratory protection devices and,
refitting for the respiratory protection device each six months or when a significant change in the
face to mask fit is detected.

c. **Asbestos Awareness Training.** All facilities Services personnel who are likely to encounter ACM
in the course of their work shall be given formal asbestos awareness training. The contents of this
training are presented in Attachment A.

5. **Medical Monitoring**

All personnel who are required to work with friable asbestos will receive medical surveillance in accordance
with State law.

6. **Reporting of Incidents**

a. Any incident, accident or emergency resulting in a known exposure of one or more employees
much be immediately reported to Technical Services who will assess the case and determine whether
notification of DEQ is required. In making the assessment, Technical Services will use the reporting
criteria summarized as follows:

The employee(s) is unprotected by an appropriate respirator.

The employee(s) is exposed to asbestos fibers in air at the following time-weighted concentrations:

8-hour time weighted average concentration of greater than .01 fibers/cc.

b. If required, Technical Services will report the incident to DEQ within 15 days of the event. The
items which shall be addressed in the report include:

The number of employees overexposed.
The circumstances surrounding the over-exposure.
Steps taken to prevent recurrence or avoid future over-exposures.
The results of any environmental analyses done to monitor employee exposure or define the hazard.
The type of structure being repaired, constructed or demolished, or the product being manufactured.
A copy of each report submitted to Labor and Industry shall be posted in Technical Services in the
locations where the incident occurred, and in other locations where it will be conspicuous to other
potentially affected employees.
E. Waste Management

All asbestos-containing waste materials are considered special wastes and must be handled and disposed in accordance with State and Federal asbestos regulations. This involves one of the following:

For asbestos abatement contracts, the UM Project Manager shall ensure that provisions for proper asbestos waste handling, storage, and disposal are included in the contract specifications.

For asbestos waste generated by UM activities (in-house work), the job supervisor shall ensure that asbestos-containing wastes are delivered to Allied Waste Services with pre-notification and correct packing.

Asbestos waste shipment will be done by a DEQ accredited asbestos worker or contractor/manager.

1. Fill out waste shipment record with the following information
   a. Name address and telephone number of waste generator.
   b. The administrator (DEQ) Helena, MT 59620-0901.
   c. The approximate quantity of RACM waste.
   d. Asbestos project permit number issued by DEQ.
   e. The name and telephone number of the disposal site operator.
   f. The name and site location of the disposal site.
   g. Date transported.
   h. The name, address and telephone number of transporter.
   i. A certification that the contents of this shipment are fully and accurately described by proper shipper name and are classified, packed, marked and labeled and are in all respects in proper condition for transport by highway according to applicable international and government regulations.

2. Ensure the asbestos waste is adequately wet.

3. Require all personnel who transport or handles asbestos waste to be qualified in, fit test for and using appropriate respirator and wearing appropriate protective clothing.

4. Load containers containing RACM waste into a dumpster, trailer or transport device lined with 6 mil thick plastic.

5. Ensure transport device is placarded with asbestos danger signs as it is being loaded and unloaded.

6. Retain handling responsibility for asbestos waste until the waste is delivered to and accepted by the operator of a DEQ-approved asbestos waste disposal site and a receipt of the waste shipment record is received and made apart of the project file.

1. Emergency Response Assistance

When emergency assistance is needed to recover from an asbestos-related event outside of normal business hours, contact University Police at extension 4000 and request that they in turn contact the following UM personnel:

Greg Plantz  
Maintenance Superintendent  
Hugh Jesse  
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F. Standard Operating Procedure Small-scale Asbestos Removal

This Standard Operating Procedure (SOP) provides guidance and requirements for the small-scale removal of asbestos-containing materials (ACM). ACM is present in structures in a wide variety of forms and this SOP addresses several types of removal operations as separate items. The requirements of this SOP are in addition to the applicable requirements described in the parent procedure Asbestos Management Program.

1. Friable ACM Definition

Many of the protection requirements for ACM removal depend on whether or not the material is considered friable. The determination of friability is, therefore, a critical step in developing the strategy of ACM removal. If a suspect material is, when dry, capable of being crumbled, pulverized or reduced to a powder by hand pressure, and if the material contains asbestos fibers in excess of 1% it is considered friable ACM and must be treated as a potentially hazardous material.

2. General Protection Requirements

Primary consideration will be given to the protection of building occupants. The following steps shall be taken for any work that may involve disturbing friable ACM:

- Restrict entry to the area for all personnel other than those needed to perform the work.
- Post signs to prevent entry by unauthorized personnel.
- Shut off or temporarily modify the air handling system, and restrict other sources of air movement.
- Use work practices (e.g., glove bag operation as described below) which are designed to inhibit the spread of any fibers released by the work being performed.
- All personnel that are required to work with friable ACM must be properly trained and protected. As a minimum, this protection entails:
  - Asbestos hazard awareness training. Medical surveillance.
  - Fitting for a respiratory protection device.
  - Refitting for the respiratory protection device each six months or when a significant change in the face to mask fit is detected.

3. Air Monitoring

Technical Services (TS) or the consultant will monitor for asbestos fiber levels in the breathing zone of the employees and in the ambient air after a removal project. Prior to an asbestos removal project TS or the consultant will perform ambient air samples at the site of removal.

4. Glove Bag Operations

All glove bag removal operations will be done inside a mini-enclosure. The Glove Bag method provides a safe and easy means for removal of small amounts of ACM on pipes and in small surface areas. The following procedures should be followed when the glove bag method is used to remove ACM.

Utilize personal protective clothing, such as the Tyvek suits, gloves and respiratory protective mask that has been provided and fitted by Environmental Health and Risk Management.
Isolate the area where the ACM is located. Place barrier tape across the doorways and at least 20 feet around the area where the ACM is located, place visqueen under the glove bag set-up.

Ensure that all ventilation units that lead to or from the area where the ACM is located are shut off and tagged out.

Don the respirator and perform a negative and positive pressure test on the device. If you are unable to obtain a successful pressure test on the respirator, see your supervisor. **DO NOT PROCEED WITH ACM WORK WITHOUT A PROPER RESPIRATOR FIT.**

Determine the area where the ACM is to be removed. Place the glove bag next to the pipe and measure how much area will need to be removed. Tape the area on the pipe to delineate the area from which ACM will be removed. Tape the bottom seam of the glove bag. Slit the side seams of the glove bag to fit the pipe diameter. Seal the sides and top seam with tape and or staples after placing the necessary tools into the bag. Cut a small hole in the bag in the same area where the wetting wand will be placed during the actual ACM removal stage. Fill the bag with smoke from the smoke pencil and seal the hole. Gently squeeze the bag and observe any leaking areas. Tape the leaking areas to achieve an airtight seal. If the pipe lagging is badly damaged or deteriorated the ACM may require wetting or taping to prevent a further release of fibers.

Most glove bags will melt or deteriorate at temperatures of 130 F or more. For steam or hot water lines, it may be necessary to shut off the pipe valve to insure that the bag does not deteriorate or that the worker does not receive burns.

Wet the ACM completely prior to removing and keep the ACM wet during the removal process. Use amended water in an airless spray pump. A hand spray bottle may also be utilized. The hole created for the spray wand can also be used for the HEPA wand.

All visible suspect ACM must be removed from the pipe using a hard brush and amended water while the glove bag is still in place. Wet wipe and spray the pipe with encapsulate material prior to removing the glove bag. Special attention must be given to exposed ends of pipe lagging.

Place all tools into one of the armholes and pull inside out. Tape and cut the glove or arm from the glove bag and remove the tools while they are still sealed in the arm or glove.

Wet the inside of the bag with amended water and place the vacuum wand into the bag and cause the bag to collapse. Seal the bag and remove from the pipe. Place the bag into another 6 mil ASBESTOS DISPOSAL plastic bag and seal this bag. This bag must be marked as an ASBESTOS DISPOSAL BAG.

The exposed section of pipe will now be closed and sealed with a non-asbestos material.

If the remaining pipe contains ACM, the pipe must be labeled DANGER ASBESTOS MATERIAL.

NON-FRIABLE ACM

5. Type of non-friable ACM
Many types of ACM do not meet the criteria for friability, but nevertheless can pose a health hazard if not managed properly. The type of non-friable ACM most commonly encountered at UM is a flooring material known as vinyl asbestos tile (VAT). Other non-friable forms may include roofing felt, underground water
lines, laboratory bench tops, etc. Although the following requirements relate specifically to VAT, the principles are generally applicable to other removal projects involving non-friable ACM.

a. VINYL ASBESTOS TILE (VAT)
Most vinyl asbestos floor tiles on campus are of the 9X 9 tile size. The floor tiles are held in place by an adhesive (mastic) that may also contain asbestos. If there is any doubt whether a specific area of VAT or mastic contains asbestos, call Technical Services at 243-6050 to arrange for positive identification. (Note: Most flooring material in buildings constructed prior to the mid-1970s should be considered as suspect ACM).

Because there is a possibility that during a VAT procedure employee may become exposed to asbestos fibers in excess of the PEL, the notification procedure for VAT jobs is the same as that prescribed for the glove bag operation above.

All removal of VAT should be performed under wet conditions.

The tiles should be removed with the least amount of breakage of the tiles.

All vacuuming **MUST** be performed with a HEPA-filtered vacuum machine only.

Mopping may be used to wet-clean debris (which must be assumed to contain asbestos) from the floor. The mop is to be moved in one direction for no more than six feet, turned over, and the action is repeated for six more feet in the same direction. At the end of the two passes the mop is to be rinsed in a water bucket. These actions may be repeated, utilizing the same bucket of water until the water becomes visibly soiled.

Mop heads are to be used for one project only. They are to be disposed of by placing them into an asbestos disposal bag at the end of the project. Asbestos-containing rinse water may also require controlled disposal. Contact Technical Services for guidance on disposal of all asbestos contaminated wastes.

6. Documentation
Technical Services will maintain a record of all bulk material and air sampling results performed in support of friable or non-friable asbestos removal projects.

G. Operations and Maintenance Program Summary and Purpose

This section describes the Operations and Maintenance (O&M) Program, which has been established and implemented at the University. This program applies to asbestos-containing materials (ACM) which are managed in place, as opposed to management by abatement (removal). The purpose of the O&M Program is to define a course of action aimed at safeguarding the health of University employees, students, and visitors by maintaining ACM in a stable condition, thereby preventing deterioration or damage that can result in the release of asbestos fibers.

Specifically, the four directives that have been established to accomplish this objective are to:
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MAINTAIN ACM in good condition.
ENSURE proper cleanup of release of asbestos fibers.
PREVENT further release of fibers.
MONITOR the condition of ACM on campus.

The O&M Program is a major component of the overall University Asbestos Management Program. It provides a system of surveillance, control, and work practices that apply specifically to O&M activities. These procedures are used in conjunction with other elements of the Asbestos Management Program, such as notification, training, and record keeping.

1. Program Components

   a. **Surveillance.** Awareness level trained crafts personnel will perform regular surveillance of ACM to note, assess, and document any changes in the condition of the materials. This includes a visual, and if necessary, tactile, reinspection of known ACM as encountered. Technical Services (TS) will sample dust found in areas around ACM, and will also perform supplemental periodic air monitoring based on O&M report, assessed priorities, and in the event of fiber release episodes.

   b. **Work Control.** Activities that may disturb ACM will be accomplished by TS. Work orders that have potential for disturbing ACM due to proximity to the material or the nature of work performed, and pertinent information received from estimators or maintenance staff, will be sent to TS for evaluation. TS will perform necessary sampling of suspect ACM.

   c. **Work Practices.** Work practices for custodial, maintenance, and trade workers will be tailored to the likelihood that ACM may be disturbed and fibers released. Four categories of O&M work practices are involved.

   d. **Worker protection programs.** These include the UM Respiratory Protection Program, personal and area air sampling, use of appropriate personal protective equipment, and most importantly, administrative and engineering controls where feasible.

2. Basic O&M procedures.

   General glove bag procedures are described elsewhere. Work practices such as wet wiping, area isolation, HEPA vacuuming and use of personal protective equipment are to be employed whenever feasible.

3. Special O&M cleaning techniques.

   Special cleaning practices are required for exposed surfacing or insulation ACM, especially if the ACM is friable. Proper O&M cleaning involves the use of wet cleaning or wet wiping practices to pick up asbestos fibers. The use of vacuum cleaner equipped with a high efficiency particulate air (HEPA) filter is preferable to wet cleaning in some instances, especially where significant amounts of asbestos debris is known to exist. Ordinary vacuum cleaners shall not be used for O&M cleaning. Dry sweeping or dusting can result in suspension of fibers and should not be used.

   Response to asbestos fiber release episodes. Releases from incidents involving greater than 3 square or linear feet of ACM are to be managed by isolating the site, erecting barriers, shutting off ventilation systems, notifying TS and other affected personnel, and clean-up under the guidance of TS and the procedures in this
document. TS will coordinate clearance air sampling and notifying government agencies, if required. Minor releases (involving less than 3 square or linear feet of ACM) may be handled using wet methods, HEPA vacuums, etc., with notifications and other guidance coordinated by TS.
ATTACHMENT A

A. Asbestos Hazard Awareness Training Purpose

The purpose of this procedure is to describe the asbestos awareness-training program. Individuals who are considered Asbestos Competent Persons as defined in the AHERA legislation administer this training. OSHA covers 2 hour asbestos awareness training in 29CFR1926.1101.

1. Contents
   a. Part I Introduction
      Introduction of Speakers
      Job Title
      Education, training, and experience (established credibility)
      Purpose of Class
      Provide general information regarding asbestos to workers who are considered non-asbestos workers
      Address questions students may have on the subject
      Overview of Class
      Discuss topic areas
      Encourage the discussion aspect of the class
      Get an idea of the trades represented
      Familiarize yourself with your audience
      Identify experts for later discussions
   b. Part II History
      Define Asbestos derived from Greek word meaning inextinguishable
      Early uses
      Spun into cloth similar to cotton
      Wicks of lamps
      Pottery Finnish potters added to clay to give strength
      Re-discovery
      Fell out of use in early A.D.
      Re-discovered usefulness at the beginning of the industrial revolution
      It is estimated that in 1890, 1,000 tons of asbestos was used in the United States. By 1978, 6,000,000 tons were used.
      Common uses of Asbestos seen today (Discussion) Write suggestions on the board
      Pass out handout of asbestos found in buildings
   c. Part III Types of Asbestos and Their Uses
      Asbestos is any one of six (6) naturally occurring silicates
      Mineralogical classifications include:
      Serpentine (e.g. chrysotile)
      Amphibole (e.g. amosite)
      Discuss species of asbestos, mineralogic class, common names, characteristic (Refer to handouts and
d. Part IV Health Effects of Asbestos

i. Respiratory Tract

- Vast majority of asbestos-related disease is respiratory
- Normal function of respiratory system
- Filtration mechanism for inhaled contaminants review functions
- Impaction in nose and mouth
- Mucous lined airways
- Ciliated cells in airways
- Macrophages in alveolar region

ii. Asbestosis characterized by fibrotic scarring of the lung

- Reduces lung capacity lungs cannot expand
- Latency fifteen to thirty years.
- Clear dose/response relationship: the greater the asbestos exposure, the greater the potential for injury
- The proposed mechanism for asbestos development is as follows: A few fibers are not filtered out in the upper airways the fibers reach the terminal air sacs (alveoli)
- Macrophages in the alveolar region
- Asbestos is inert, therefore, it cannot be broken down, a coating is subsequently deposited on the fiber
- Scar tissue forms around the fiber
- Increased scarring throughout the lung results in asbestosis

iii. Mesothelioma

- A cancer of the pleura
- The abdominal cavity lining can also be affected Latency of thirty to forty years
- Can be caused by very low exposure; not directly related to dose (Steve McQueen wore an asbestos suit while race car driving. It is thought that this limited exposure may have caused his illness)
- Rapidly spreading and always fatal
- Lung cancer
- Asbestos related tumors are usually found in the lower lobes
- Most cancers found are glandular in nature which is rarely the case in non-asbestos related tumors
- Latency twenty plus years
- Dose/response relationship has been established although no safe level has been determined
- Smoking and lung cancer
- The risk of developing lung cancer among asbestos workers increases drastically if workers also smoke (use attached overhead) set the general population equal to 1
- Asbestos workers who do not smoke are five times more likely to develop lung cancer than the general public
- People who smoke but do not work with asbestos are ten times more likely to develop lung
cancer than the general public
People who smoke and work with asbestos are fifty to ninety times as likely to develop cancer
Obviously this incidence rate is due to more than just adding up factors. The term for such
relationships where risk factors increase in multiples is synergistic

iv. Mechanism #1

Smoke is inhaled and ciliated cells along the airways are temporarily paralyzed
The body can no longer defend against unwanted dust
The offending asbestos particles cannot be cleared. This allows them more time to work
downward toward the alveolar region or imbed into tissues

v. Mechanism #2

Asbestos is inhaled and trapped in fibrotic areas
Normal mechanical clearance (mucous and cilia) is disrupted
Tobacco smoke subsequently inhaled is cleared less efficiently; therefore, carcinogens in the
smoke remain in contact
Asbestos fibers preferentially settle in peripheral regions of lower lobes
Both of the proposed mechanisms result in the same disease; it is likely that a combination of
factors elicits the observed synergistic response Non-respiratory Asbestos-related Conditions

vi. Asbestos warts

Fiber bundles embed in tissue; usually hand gloves should be worn when handling asbestos
Colon, esophageal, or stomach cancer
May be asbestos-related
Fibers can work their way through soft tissues to adjacent structures and embed fibers
entering the mouth can be swallowed thereby entering the digestive tract
Asbestos physiologically generally include a rectal exam
Poor hygiene, leaving food out in contaminated areas, and carelessness all can contribute to
ingestion of asbestos

vii. Symptoms and Effects of Asbestos Exposure
Acute exposure: no immediate symptoms or effects

Chronic Exposure
Shortness of breath Dry cough
Loss of appetite
Weight loss
Asbestosis
Lung cancer
Mesothelioma
Intestinal tract cancers
By the time chronic effects manifest themselves, disease is most often irreversible

e. Part V Discussion of Conditions of Asbestos
Distribute list of areas known to contain ACM (Notification List) and discuss what causes asbestos materials to become damaged and friable
Some material is applied in a friable state
Fireproofing
Blown on acoustical insulation (Ask for more examples)
Physical disturbance
Basketballs thrown up at asbestos ceilings
Broom handles scraped along corridor ceilings
Ceiling tiles or other debris falling on pipes during renovation
Pipe work requiring breaking seal around lagging
Deterioration or delamination
Water leaks from ceiling causes ceiling asbestos coating to pull away (delamination) from base material
Steam leak
Weather
How to recognize damage
Ceiling water stains
Visibly disturbed lagging
Suspicious debris

f. Part VI Campus Asbestos Management Program

General program for control of asbestos.
Who is the campus asbestos coordinator?
What is small-scale (glove bag) removal procedure, and how are Unit 6 personnel involved.
Who performs full-scale removal on campus?
How are contractors selected?
What should be done in the event of an asbestos emergency?
What should be done if questionable material not previously classified is discovered.

g. Part VII Regulations

OSHA Asbestos Regulations (see overhead)
PEL = 0.1 fibers/cc
Action level = 0.1 fibers/cc
29 CFR 1910.1001
Notification of employees
Posting
Asbestos Hazard Emergency Response Act (AHERA)
Regulates K-12 schools only; not private sector or post I2 schools
Outlines protocol for setting up asbestos program requirements, and for training of each party involved in the response effort; specified two-hour awareness training
UM does not fall under these regulations, but rather looks to them for guidance
B. Large Scale Class 1 and 2 Asbestos Projects

1. Purpose
To set forth procedures pertaining to the use, handling and removal of suspected asbestos containing materials. These jobs will be handled by Abatement Contractors of Montana on our annual permit.

2. Background
Most of the asbestos materials for which this organization is concerned with are those used in insulation work. Some may have been in ceiling materials. The health hazard is inhaling the minute fibers. Therefore, once the materials have been installed it is normally not a hazard until it is disturbed and a dust is formed, such as in removal. Protective measures are concerned with avoiding the creation of dust as well as in the use of respirators and other protective equipment in the removal of material. University of Montana Regulations prohibits new installations of asbestos containing materials and has established regulations and procedures for the safe handling of that which has previously been installed when its removal is required.

3. Procedures – All removal work will be done according to section 5 of the Montana Asbestos Work Practices and Procedures Manual.

Effective immediately, no friable (easily crumbled or dust producing) materials containing asbestos will be used by Facilities Services nor will any be installed by contract.

In all cases of removal or abatement of suspected asbestos materials, the following requirements of this campus policy will be adhered to:
- Only full trained, tested and equipped personnel or contractors will be used in the removal of suspected asbestos materials.
- All removal, repair, or abatement work of friable suspected asbestos materials will be accomplished by the glove bag method or by the full enclosure method described hereafter.
- Material Samples will be taken on each job in accordance with policies described hereafter.
- Air samples will be taken for each job in accordance with policies described hereafter.
- An asbestos log will be maintained by Facilities Services that records all information requested by this policy on all removal or sampling projects.
- All persons involved in the occupation, or assistance of that requires the removal of suspected asbestos material will be provided with medical examinations and training on a yearly basis in accordance with the policies described thereafter.
- All personal protective equipment required for removal of friable asbestos material shall be used in accordance with the policy described hereafter and will be provided by the University for its personnel only.
- All suspected asbestos material or contaminated materials and equipment shall be disposed of in accordance with the policy described hereafter.

4. Removal and Repair Procedures
As previously described all suspected asbestos removal, repair and abatement shall be accomplished in only one of the methods, either glove bag method or full enclosure method. These are the only techniques that have been approved by the EPA as of this date.
a. **Glove Bag Method:**

1) **Notification:** The Department will notify per the asbestos notification requirements which are as follows:

   Department of Environmental Quality- Helena, Montana 10 days in advance for abatement of at least or more than 3 square feet of 3 linear feet.
   By telephone within 24 hours should abatement be an emergency situation followed with a written notification within the same 24 hour period.

2) **Project Log:** The supervisor in charge shall survey the project and determine the necessary steps to adequately protect the environment, the employees, and the general public from exposure to suspected asbestos containing material.

3) **Material Sample:** The supervisor in charge shall take a material sample and submit it to a certified asbestos analysis testing laboratory for testing prior to commencement of work.

4) **Project Review:** Prior to the start of any normally scheduled removal project of suspected asbestos material, the supervisor in charge shall not start the work until the project has been inspected and reviewed to determine if the project can be safely accomplished.

5) **Air Sampling:** The supervisor in charge will not start a job normally scheduled until all necessary air sampling provisions and instructions to the workmen have been implemented in accordance with Section VI of this policy. The same procedure applies, if possible, under emergency conditions.

6) **Personal Protection:** The supervisor will ensure that all workmen involved in the removal project have the adequate protective clothing, respirators and equipment necessary to properly conduct the project in accordance with Section IX of this policy.

7) **Restriction of Access:** The supervisor in charge shall prior to the start of the project, ensure that the Proper warning signs (per OSHA 29 CFR 1910.1001g) are posted and shall restrict the site to all unauthorized personnel for the duration of the project. Also, the supervisor in charge shall make the necessary provisions to minimize air movement out of the area.

8) **Removal:** Glove bag removal shall take place in a mini-enclosure. The material to be removed shall be enclosed in an approved glove bag (per Section X of this policy). All seams and contact points with the piping shall be properly sealed with taped joints. All necessary tools and materials needed for the project shall be in the bag prior to enclosing the suspected material. The material to be removed shall be thoroughly wetted with a solution of water and wetting agent. The workers should then carefully remove the material so as not to generate any dust and clean the remaining surfaces and seal the adjoining insulated areas to be exposed when the bag is moved or removed. Upon completion of the project or when the bag is full, the worker shall first evacuate the bag through the side port using an asbestos vacuum cleaner with a HEPA filter and then carefully remove the bag and seal the bag opening. Any tools or materials that remain inside the bag which need to be re-used and cannot be decontaminated can be removed by isolating them in the gloves, and this equipment and material which is then sealed in the
gloves can be removed from the bag and placed in the next glove bag for the rest of the project.

9). Disposal of Material Contaminated With Suspected Asbestos: The supervisor in charge and removal personnel shall take such action as necessary to insure that no suspected asbestos materials or contaminated tools and protective equipment leave the job site except in approved and impervious containers. The suspected asbestos material shall be stored in designated storage areas until arrangements can be made to ultimately dispose of the waste materials in an approved landfill in accordance with Section XI of this policy.

10). Project Termination: The supervisor in charge shall, at the completion of the project, complete the project authorization/loci form with all the required information and shall turn the form over to the Assistant Director of Maintenance (or the designated representative). The original copy shall be filed in the Departmental Asbestos Log. Also, as air sample and material sample results are received, the Assistant Director (or the designated representative) shall update the appropriate project log forms and distribute the necessary copies.

11). Notification of the building occupants: The person in charge shall notify the department chairperson of the building involved, of the pending asbestos removal project and the implications to its occupants prior to the start of the project.

b. Full Enclosure Method of Asbestos Removal or Repair:

This shall be done in accordance with the Federal Register OSHA appendix F to 1926.1101 Work Practices and Engineering Controls for Major Asbestos Removal, Renovation and Demolition Operations.

1). Removal of Vinyl Asbestos Floor Tile or Sheet Vinyl Asbestos Flooring

2). Project Log: The supervisor in charge shall survey the project and determine the necessary steps to adequately protect the environment, the employees, and the general public from exposure to suspected asbestos containing material. The supervisor in charge shall inform the campus Environmental Health and Risk Management Office as part of the notification process described above.

3). Material Sample: The supervisor in charge shall take a material sample and submit it to a certified asbestos analysis testing laboratory for testing prior to commencement of work.

4). Project Review: Prior to the start of any normally scheduled removal project of suspected asbestos material the supervisor in charge shall not start work until the project has been inspected and reviewed to determine if the project can be safely accomplished.

- Air Sampling: Abatement personnel must wear air monitors operated in accordance with Section VI B of this policy. An environmental sample is required.

- Personal Protection: All abatement personnel shall wear protective clothing and respirators necessary to properly conduct the project in accordance with Section IX of this policy.

- Restriction of Access: The supervisor in charge shall prior to the start of the project, insure that the proper warning signs are posted and shall restrict the site to all unauthorized personnel for the duration of the project.
5. **Removal:** Remove of unordered (loose lay) or peripherally adhered sheet vinyl floor covering:

Remove any binding strips or other restrictive moldings from doorway, walls, etc. Cut a strip the length of the floor about 18" wide along one wall. Remove this strip, gently turn it over and roll face out into tight roll. Secure the roll so it will not unroll and place the roll in to a disposable asbestos container.

Vacuum the exposed floor area with the HEPA vacuum. Do not dry sweep, if sweeping is required, use water or other dust suppressants.

Repeat the above, cutting, removing, rolling, disposing of one strip at a time and clearing the newly exposed area immediately until the whole floor covering has been removed and the whole floor vacuumed clean.

If seams or door openings have been adhered with double faced tape, remove tape and place in a disposable asbestos container.

If any floor covering areas have been adhered with adhesive and remain stuck to the floor, they should be removed by wet scraping per paragraph 9 of this section of this policy.

**Removal of Adhered Sheet Vinyl Floor Covering:**

Remove any binding strips or other restrictive moldings from doorways, walls, etc. Make a series of parallel cuts four to eight inches apart through the layers parallel to wall. Start at the end of the room farthest from the door entrance and pry up the corner of a strip, separating the backing layer. Pull the layer back upon itself slowly and evenly at the angle that permits the best separation. After it is removed, roll up the strip; face out into a tight roll. Secure the roll so it will not unroll and place the roll into a disposable asbestos container.

Each succeeding strip should be removed in the above manner. Remove the felt remaining on the floor in the stripped area by wet scraping in accordance with paragraph 9 of this section of this policy.

**Removal of Floor Tile:**

Remove any binding strips or other restrictive moldings from doorway, walls, etc. Start the removal by wetting the work area. Carefully wedge a wall scraper in the seam of two adjoining tiles, gradually forcing the edge of one of the tiles, up and away from the floor, avoid breaking tiles. Keep the work area wet using a mist type sprayer. **Note: safety goggles should be worn.**

When the first tile is removed, place it, without breaking into smaller pieces, in a disposable asbestos container.

Where tiles require additional force for their release, use a hammer to strike the scraper handle with sharp blows of moderate force while maintaining the scraper at a 25 degree to 30 degree angle to the floor. **Wear safety goggles.**
If the above techniques prove inadequate, a hot air gun should be used to heat the tile and adhesive, thereby allowing the scraper to remove the floor tile. Glove and eye protection should be used when handling the hot air gun and heated floor tile and adhesive. In areas of sub-floor that are cleared of tile, remaining adhesive requiring removal should be scraped using wet scraping techniques in accordance with this policy. Scrapings and floor tile are to be placed in disposable asbestos containers.

6). *Wet scraping Method:* As areas of floor are exposed, thoroughly wet residual felt, adhesive and working area with water or solution of wetting agent and water. Allow time for soaking, with felt. Using stiff bladed scraper, scrape up felt and or adhesive. Re-wet area as it dries out. Place scrapings as they are removed in a disposable asbestos container.

When the whole floor has been cleared of felt and or adhesive, let it dry and vacuum up any dirt using a HEPA vacuum.

c. Material Sampling Method: Sampling to be done by a Montana certified inspector.

1). *Identification of Potentially Friable Asbestos Materials*

2). *Bulk Asbestos Sample Collection:* A bulk sample may be collected to determine whether the ceiling or other construction material contains any asbestos fibers. Use a small sealable glass, or plastic-capped container, or a sealable plastic sample bag to collect the sample. While wearing an approved respirator and using wet removal techniques, holding the container as far as possible from the face, obtain a full thickness core sample of the sprayed material by penetrating the surface with the container, using a twisting motion. Any surface coating such as paint on a cement material must be penetrated to the substrate. The container is then capped, wet wiped, and sealed with tape, test area encapsulated. Identification should include ID code, building name, address, building tube, sample source, location. Date and name of person who took sample.

1. Visually inspect the areas to identify the location of all suspect ACM.
2. Collect bulk samples from each surfaced material that is not assumed to be ACM in a random manner that represents the material.
3. Collect bulk samples from each surfaced material that is not assumed to be ACM in a random manner that represents the material.
   a. Collect at least 3 bulk samples in areas 1000 square feet or less.
   b. Collect at least 5 bulk samples in areas greater than 1000 square feet but less than 5000 square feet.
   c. Collect at least 7 bulk samples in areas greater than 5000 square feet
4. Collect at least one bulk sample from each area of patched thermal insulation that is not assumed to be ACM if the patched section is less than six linear or six square feet.
5. Collect at least 3 bulk samples from each type of thermal system insulation that is not assumed to be ACM in a random manner.
6. Collect at least 3 bulk samples from each insulated mechanical system that is not assumed to be ACM where cement or plaster is used on fittings.
7. Collect at least 3 bulk samples from each type of miscellaneous material that is not assumed to be ACM.
8. If any type of non-friable suspected ACM is not assumed to be ACM, collect at least 3 bulk samples.

3). Collect Samples as follows: Taking a sample of asbestos containing material can damage the material and cause significant release of fibers. The following guidelines are designed to minimize both damage and fiber release.
   - Wear at least a half-face respirator with approved disposable filters.
   - Clear the area of other people.
   - Wet the surface of the material to be sampled with water from a spray bottle or place a plastic bag around the sampler.
   - Collect sample.
   - With a twisting motion, slowly push the sampler into the material. Be sure to penetrate any paint or protective coating and all the layers of the material.
   - For reusable samplers, extract and eject the sample into a container. Wet-wipe the tube and plunger. For single-use samplers, extract, wet-wipe the exterior, and cap it.
   - Label the container.
   - Clean debris using wet towels and discard them in a plastic bag.
   - Seal all sample areas with encapsulate.

d. Air Sampling Method:

1). Full Enclosure Method: Sampling for airborne asbestos fibers shall be performed before, during, and after asbestos stripping operations. During stripping, samplings in the removal work area, samplings outside containment barriers and outside the building should be of sufficient number and frequency to determine the adequacy of the contamination control. Air sampling is the only valid means for verifying the completeness of the removal process and cleanup. Post-removal sampling during custodial activity is most likely to reveal no residual contamination from settled fibers if the wet removal procedures are followed. Copies of laboratory results or air sampling shall be sent to the Technical Services.

2). Glove Bag Method Requirements:
   - Air sample taken within the breathing zone of each employee as per OSHA, 29CFR 1910.1001. Personal Monitoring - (i) Samples shall be collected from within the breathing zone of the employee 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. Samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees.
   - At least one environmental sample shall be collected as per OSHA, 29CFR 1910.1001 when contamination of work area is suspected.
   - If removal area has been evacuated, then re-occupancy should not occur until a confirming air sample has been verified.

e. Notification Requirements:

Note: Section a.11), addresses notification of building occupants.
If an abatement project involves asbestos removal amounting to at least or more than 3 linear feet of...
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pipe covered by asbestos materials or at least or more than 3 square feet of asbestos material,

the State of Montana, Department of Environmental Quality, Waste and Underground Tank
Management Bureau, Asbestos Control Program, P.O. Box 200901, Helena, MT 59620-0901 must
be notified with written notification of the abatement project 10 days in advance.

f. Records Requirements:

1) Job Log: An Asbestos Log and Work Authorization Form must be completed for every job
involving asbestos removal.

2) Medical Testing and Records Requirements: Within 20 days of an employees initial
exposure to airborne asbestos fibers and at least annually thereafter, The University of
Montana will provide a comprehensive medical examination which includes, as a minimum, a
chest roentgenogram (posterior - anterior 14 x 17 inches), a history to elicit symptomology of
respiratory disease and pulmonary function tests to include forced vital capacity (FVC) and
forced expiratory volume at 1 second (FEV.).

Any exposure record consisting of personal and environmental monitoring shall be kept for
each Employee exposed to airborne asbestos fibers. If the monitored level exceeds
0.05 fibers per cubic centimeter (f/cc) then action will be taken to: 1) Reduce the level of
exposure; 2) Provide for medical examinations; and 3) Provide personal protective devices.
The actual count where exposures require respiratory protection is 0.1 f/cc, according to the
Occupational Safety and Health Administration regulations 29 CFR 1910.1001 and 1923.53
and Environmental Protection Agency regulation 40 CFR Part 763.

Monitoring is performed by placing a cassette in the employee's breathing zone. The cassette
holds a filter of 0.3 micron pore size which will trap the asbestos fibers. Air is pulled through
the filter at .5 liters per minute operation by a pre-calibrated pump. The pump is worn on the
employee's belt. A small hose runs from the pump over to the cassette. The cassette is attached
to the collar by a clip.

If at any time an employee is found to have been exposed to airborne concentrations of fiber in
excess of 0.1 fibers per cubic centimeter of air they shall be notified in writing of the finding
and shall be notified of corrective action being taken.

The above records will be kept on file for at least 30 years and shall be made available upon
request to the EPA and the State of Montana, to authorized physicians, and upon the request of
an employee or former employee, to his physician.

3) Training: All personnel working in or with the University's Asbestos Program shall receive
the required training in accordance with Montana state laws.

g. Personal Protective Equipment and Clothing:

The following equipment is provided to the employees of the University for the safe handling and
disposal of suspected asbestos materials and shall be used in accordance with procedures established
1) **Respirators**: Each employee who works with suspected asbestos material shall use a personal form fitted cartridge type of air purifying respirator and shall be medically tested in accordance with policy of procedures described to determine if the employee can function normally with a form fitted respirator. The employee shall then be issued a personal form fitted and tested respirator. The use and maintenance of the respirator will be the responsibility of the employee.

2) **Clothing**: Disposable clothing will be made available to University personnel in an occupation involved in the removal of suspected asbestos materials. Disposable clothing, and filter cartridges shall be secured at the project site and disposed of in the same manner as suspected asbestos materials.

3) **Bag Method**: When a suspected asbestos removal project is accomplished by the previous described method the worker shall wear disposable coveralls, including boots and hood. Also, the employee can wear the coveralls over street clothing because a shower is not required to leave the work site.

4) **Full Enclosure Method**: This will be complete containment of the affected area in accordance with the work practices and engineering controls described in the Federal Register OSHA appendix F to 1926.1101.

   **Examples of Disposable Clothing**:
   - **Coverall-Disposable Clothing**: An asbestos approved breathable one piece type which includes attached hood and boots.

**h. Protective Equipment**

The following equipment and supplies shall be made available to the University personnel involved in suspected asbestos removal projects and shall be used in accordance with these policies.

1) **Plastic Sheeting/Bag**: All plastic sheeting to cover floors and bags shall be a minimum of 6 mils in thickness. Plastic sheeting to be used to cover walls and equipment or to construct locks shall be 6 mils in thickness.

2) **Pipe Insulation Removal Bags Example**: An approved glove bag equivalent to 6 mil or thicker.

3) **Air Sampler**: Example: Gillian personnel air sampler and its accessories or equivalent with an adjustable pump capable of between .5 - 2.0 liter/min. to 10 liter/min. Also the filter assembly shall have a filter half size of .8 microns.