1. **PURPOSE**

Wake Forest University has developed an Asbestos Management Program to ensure protective measures are in place for employee safety and health. This program describes responsibilities of personnel involved in asbestos management and abatement and the steps to regulate asbestos exposure.

2. **REFERENCE**

29 CFR 1910.1001  
29 CFR 1926.1101

3. **DEFINITIONS**

Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-containing material (ACM) means any material containing more than 1% asbestos.

Authorized person means any person authorized by the employer and required by work duties to be present in regulated areas.

Competent person means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f): in addition, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR part 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).
Demolition means the wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

Disturbance means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which shall not exceed 60 inches in length and width.

Employee exposure means that exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

Fiber means a particulate form of asbestos 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

High-efficiency particulate air (HEPA) filter means a filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

PACM means “presumed asbestos containing material.”

Presumed asbestos containing material means thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as “PACM” may be rebutted pursuant to paragraph (j)(8) of this section.

Regulated area means an area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limits.

Removal means all operations where ACM and/or PACM is taken out or stripped from structures or substrates, and includes demolition operations.

Renovation means the modifying of any existing structure, or portion thereof.

Repair means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

Surfacing material means material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

Surfacing ACM means surfacing material which contains more than 1% asbestos.

Surfacing material means material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).
Thermal System Insulation (TSI) means ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

Thermal System Insulation ACM means thermal system insulation which contains more than 1% asbestos.

4. RESPONSIBILITIES

Asbestos Coordinator

WFU has appointed an Asbestos Coordinator to oversee all asbestos surveys and abatement activities and to maintain asbestos survey and abatement records. The responsibility of the Asbestos Coordinator includes oversight of the University’s Asbestos Management Program.

Asbestos Inspector

The Asbestos Inspector must be a North Carolina certified Asbestos Inspector. Responsibilities include inspecting building materials for ACM, including collection of samples of building materials for analysis. The Asbestos Inspector will also assist in the maintenance of the campus-wide asbestos survey.

Asbestos Management Planner

The Asbestos Management Planner must be a North Carolina certified Asbestos Management Planner. Responsibilities include hazard assessments of areas that contain ACM and scheduling of abatement. The Asbestos Management Planner assists in the maintenance of the campus-wide asbestos survey.

Asbestos Abatement Project Designer

The Asbestos Abatement Project Designer must be a North Carolina certified Asbestos Abatement Project Designer and is a contract service for Wake Forest University.

Responsibilities include designing abatement projects as required by AHERA (Asbestos Hazardous Emergency Response Act of 1986), and coordination with Management Planner and Inspector for project design criteria detailing scope of work and the Supervising Air Monitor (SAM) as project requires.

Asbestos Supervising Air Monitor (SAM)

The Asbestos Supervising Air Monitor must be a North Carolina certified Asbestos Supervising Air Monitor and is a contract service for Wake Forest University. Responsibilities include supervising air monitoring tasks prior to removal, during removal, and after removal as required by AHERA.
The Asbestos Supervising Air Monitor coordinates with Management Planner, Inspector, Project Designer, and Air Monitor for development of the air monitoring plan and provides licensure for WFU Air Monitors to work under his supervision.

**Asbestos Air Monitor**

The Asbestos Air Monitor must be a North Carolina certified Asbestos Air Monitor. Responsibilities include conducting air monitoring tasks prior to removal, during removal, and after removal as required by internal protocols, SAM Air Monitoring Plan, and / or AHERA.

**Asbestos Abatement / Removal Contractor**

Contractors conducting removal of ACM at WFU must meet all requirements of North Carolina’s Asbestos Regulatory Requirements.

Responsibilities include applying for Abatement Permits from the State of North Carolina on behalf of WFU and supervising abatement worker activities prior to removal, during removal, and after removal as required by AHERA. Contractors will coordinates with Management Planner, Inspector, and Project Designer for development of the scope of work and schedule and provide copies of all records relative and required for each abatement project. The Contractor will also arrange for disposal of ACM Waste on behalf of WFU.

**Environmental, Health and Safety (EHS)**

EHS will develop and implement the WFU Asbestos Awareness Training Program and maintain training records, asbestos abatement records, and the campus-wide asbestos survey.

The EHS Office will review the Asbestos Management Plan annually.

**5. PROCEDURE**

This program is in place to ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA) and that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes.

All building material will be considered Presumed Asbestos Containing Material (PACM) unless otherwise indicated by the Asbestos Coordinator or Asbestos Inspector. PACM will be confirmed through representative sampling. Sampling will be conducted by the Asbestos Inspector. No one other than the Asbestos Inspector may take samples of PACM. A Work Order must be issued prior to sampling of PACM. Samples will be
collected by the Asbestos Inspector after receipt of the Work Order. The Asbestos Inspector will send the sample to a certified laboratory for analysis.

All asbestos abatement will be performed by a licensed contractor. Contractors will perform all work and exposure monitoring in accordance with 29 CFR 1910.1001 and 29 CFR 1926.1101.

The abatement operations will be conducted within a regulated area where airborne concentrations of asbestos exceed the PEL, or there is a reasonable possibility they may exceed the PEL. Posted signs will designate the regulated area, and the area will be demarcated to minimize the number of persons within the area and protect persons outside the area from exposure to airborne asbestos. Only authorized, competent personnel may enter the regulated area. Respirators will be worn as required, and no one is permitted to eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.

Asbestos waste will be disposed by the Contractor in a permitted Subtitle D landfill approved by EHS.

Communication of hazards

During New Hire Orientation, employees are told of the presence of ACM on campus. Areas where ACM is present, health effects of exposure, and precautions to prevent exposure are reviewed.

Notification of the presence, location and quantity of ACM or PACM must be given to prospective employers applying or bidding for work whose employees can be expected to work in or adjacent to areas containing such material. This notification will also be made to employees who will work in or adjacent to areas containing ACM or PACM and tenants who will occupy areas containing such material.

No repair or renovation work is to be performed in areas containing ACM prior to abatement or encapsulation. Before abatement or encapsulate work is performed, employees who work in and adjacent to the area will be informed of the location and quantity of ACM and/or PACM present in the area and the precautions to be taken to insure that airborne asbestos is confined to the area.

If ACM and/or PACM are discovered on a worksite, information concerning the presence, location and quantity of newly discovered ACM and/or PACM will be made to other employees working at the work site, within 24 hours of the discovery.

Disturbed, Damaged ACM

When ACM is identified as damaged or disturbed, the area will be designated as a regulated area and the ACM will be abated or encapsulated. Only authorized, competent personnel will be allowed access to the area until it is cleared of the hazard.
6. **TRAINING**

All employees of the University who perform maintenance or custodial work are required initial and annual Asbestos Awareness training. EHS will maintain employee training records.

The Asbestos Training shall cover the following topics:

- Types of asbestos at Wake Forest University
- Identification and inspection protocols of asbestos containing materials
- Health effects from asbestos exposure
- When is asbestos potentially hazardous
- Discussion of Wake Forest University's Asbestos Management Plan

Facilities and Campus Services employees whose work may impact the condition of floor tile are required Operations and Maintenance training on an annual basis. A copy of the training program for Operations and Maintenance is located in Appendix I.

7. **REVISIONS**

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<td>Revision for signing authority change to Associate Vice President, Strategy and Operations</td>
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APPENDIX I

Asbestos Training For Operations and Maintenance

Introduction:

Wake Forest University will provide training to employees that have the potential to come into contact with ACM (Asbestos Containing Material) during normal operations and maintenance. As required by OSHA (Occupational Safety and Health Administration), the training must cover the following criteria:

- Define asbestos and its use
- Identify asbestos containing material and the signs of disturbance or deterioration
- Health effects of asbestos and smoking
- Work Practices and WFU’s Asbestos Management Program

The training will be provided annually to those employees who are responsible for operations and maintenance (O&M) at WFU in areas that may contain ACM. ACM becomes a problem when it is disturbed and the potential for airborne particles are released. OSHA requires that workers who contact ACM be trained to handle asbestos so as to minimize the release of fibers.

OSHA classifies O&M workers as Class IV asbestos workers if they contact asbestos while carrying out O&M activities or if they perform housekeeping activities incidental to construction work. The construction standard of OSHA 29 CFR 1926, divides asbestos workers into four categories. At WFU, only limited Class III and Class IV work will be performed by Facilities Management employees. Class III workers are maintenance workers who must remove ACM to carry out maintenance activities. Class IV workers are maintenance workers who merely contact ACM.

What is asbestos?

Asbestos is a natural mineral – a mineral like quartz or coal found in a certain type of rock formation. This type of rock formation exists in all parts of the world. There are asbestos containing rock formations in North Carolina, existing from Raleigh to Morganton.

There are two groups and six different kinds of asbestos:

- **Group I**: Serpentine – curvy and flexible
  - Chrysotile
- **Group II**: Amphibole – straight and stiff
  - Amosite, Crocidolite, Anthophylite, Tremolite, & Actinolite

Asbestos ranges slightly in color, chemical composition, shape, and suppleness. When asbestos fibers split, they break down through the middle like a hair splitting. Chrysotile asbestos is the most commonly type found at WFU.
What are common products at WFU that contain ACM?

- Sprayed-on or towed-on surfacing materials (SM)
- Thermal Insulation (TSI)
- Resilient Flooring
- Ceiling Tile and lay-in board
- Mastic on Floor Tile
- All types of adhesives, cements, coatings, & sealants
- Roofing felts, roofing asphalt

Characteristics of Asbestos:

Fire Resistant – asbestos is non-combustible and non-flammable
Insulation – asbestos fibers have air filled pockets that retard the transfer of heat, noise, and electricity
Tensile Strength – asbestos can withstand a great amount of stress or tension without tearing apart
Good Friction & Wear Characteristics – asbestos was an excellent material for brakes and clutches
Resistant to Mold & Corrosion – asbestos does not rot, mold, or corrode to acid, water, or alkalis

Because of the appealing and lasting qualities of asbestos, asbestos containing materials (ACM) were manufactured and have been used extensively since the Industrial Revolution. As a result of the abundant use and manufacturer of ACM, many workers have been exposed to unacceptable levels of asbestos fibers and became ill with asbestos-related diseases and conditions.

Banning of Asbestos Products:

It all began in 1978, when the EPA (Environmental Protection Agency) banned the use of towed-on or sprayed-on surfacing material (SM) and thermal insulation (TSI). In 1989, the EPA banned certain products such as corrugated, commercial, and specialty paper and flooring felt.

Products that were once banned and are no longer banned are widely used in the US are pipeline wrap, vinyl-asbestos tile, millboard, asbestos clothing, asbestos-cement corrugated sheet, flat sheet, asbestos cement pipe, roofing felt, and asbestos cement shingles.

The US government and governments around the world use a lot of asbestos and stockpile it. The global supply of asbestos may be hinged on supply as well as safety. Today’s reserves are being depleted. At this time, there is no close substitute for asbestos; however, there are things such as: fibrous glass, ceramic fibers, and different minerals being used in products to provide as much stability as asbestos.
Identifying ACM:

First, there is no way to look at a material and deem that it is asbestos or not asbestos. The only true way to define if a product has asbestos is to sample that product by an accredited inspector and send the sample to an accredited laboratory. As defined by OSHA, if a material (see below) was installed or used prior to 1981, the material is presumed asbestos containing material (PACM). By law, these materials contain asbestos unless analysis of a bulk sample shows they contain 1% or less asbestos.

- Sprayed-on or troweled-on surfacing material (SM)
- Thermal System Insulation (TSI)
- Resilient Flooring
- Dust and Debris from PACM and know ACM

Identifying Resilient Flooring:

There should be no problem with identifying resilient flooring. Resilient flooring includes:

- Asphalt, rubber, and vinyl asbestos tile
- Latex backing on tile and sheet flooring
- Rubber and vinyl felt backing on sheet flooring
- Asphalt cutback adhesive

The following information is a good example of what to consider when working with resilient flooring:

Asphalt, rubber, and vinyl asbestos tile come in 9”x9” or 12”x12” squares. Asphalt tile is typically dark colored, but light colors do exist as well. Before 1981, about half the 12”x12” tiles and nearly all the 9”x9” tiles contained asbestos. Asbestos was also used in the backing material on some sheet goods and linoleum and some asphaltic “cutback” adhesives to make them more durable. Sheet vinyl flooring comes in 6’ and 12’ widths.

**Remember you cannot tell if flooring contains asbestos just by looking at it. Many flooring materials look the same, whether they have asbestos in them or not. However, Cutback Adhesives are easy to identify because they are black. Most of the cutback adhesive manufactured today does not have asbestos in it; however, it should not be taken for granted. It is best to review the MSDS (Material Safety Data Sheet) or technical data sheet for the chemical composition to define whether asbestos is in the composition or the product should be sampled and analyzed by an accredited laboratory.**

OSHA classified resilient flooring as PACM because:

- Resilient flooring is the most prevalent ACM.
- Resilient flooring is frequently damaged due to buffing and stripping.
- It is very accessible.
Permissible Exposure Limits:

OSHA has established permissible exposure limits (PELs) for asbestos in workplace air. PEL is the concentration of an air contaminant that can be inhaled by a worker, 8 hours a day, 40 hours a week, over a 40 year working life without unacceptable risk. The PEL defines the permissible lifetime dose over a working lifetime.

The PEL for asbestos is 0.1 fiber per cubic centimeter (f/cc) of air as an 8 hour time weighted average concentration. A cubic centimeter is about the size of a sugar cube. OSHA defines a fiber as a particle more than 5 microns long with a length to width ratio greater than 3 to 1. If you are normally an active person you will inhale ten cubic meters of air in an 8 hour workday. At the PEL of 0.1 f/cc, at the end of the day you will have inhaled one million fibers. At the end of the work year, working 250 days a year, you will have inhaled 250 million fibers.

The amount of asbestos you inhale varies not only with the concentration and time but also with your breathing characteristics.

There are no known instances where workers who merely contact asbestos have been exposed above a PEL, providing OSHA-mandated practices and procedures are complied with. It would be most unusual to find exposures that even get into the detectable range under these circumstances. Monitoring data collected by the Resilient Floor Covering Institute documents this fact.

OSHA acknowledges the relative harmlessness of casual exposure to asbestos which can occur in maintenance work as follows:

"Countless maintenance operations involving the handling of ACM are conducted... and these operations, which are small in scale and of short duration, are vastly dissimilar in degree of hazard to many other asbestos-related construction operations, such as asbestos abatement projects."

Asbestos Related Diseases:

Asbestos may be an underlying or contributing factor for heart disease, stroke, lung cancer, mesothelioma, and other cancers, as well as, asbestosis.

**Asbestosis** is the scarring of the lungs produced by inhaling asbestos. When asbestos fibers lodge in the lungs, the lungs tissue is irritated, and the small air tubes and sacs in the lungs become inflamed. As the inflammation begins to heal, permanent scar tissue remains, called fibrosis. This results in shortening in breath; therefore, the condition may lead to heart failure because not enough air is being inhaled. There is no effective therapy for asbestosis.

**Lung Cancer**- Signs of lung cancer are not unique for asbestos workers. Except for lung cancers produced by cigarette smoke, lung cancers have no distinguishing feature – no
marker- that relates them to a particular substance such as asbestos except that a chest x-ray of an asbestos worker with lung cancer may show pleural plaques, pleural calcification, or pleural fibrosis due to asbestos. Symptoms of lungs cancer, no matter the cause, include the following symptoms:

- **Persistent cough**
- **Sputum streaked with blood**
- **Wheezing**
- **Hoarseness**
- **Chest or shoulder pain**
- **Swelling in feet or neck**
- **Weight Loss**
- **Reoccurring pneumonia**

**Mesothelioma-** is a rare cancer found in the chest or intestines. The CDC (Center for Disease Control) reports that approximately 60% of the reported mesothelioma cases are linked to persons with occupational exposure. It is the most deadly of asbestos related diseases. The exact cause is unknown. It does not appear to be related to smoking. Symptoms include shortness of breath and pain the in the walls of chest or abdomen.

**Smoking and Asbestos Relationship:**

Studies have indicated that the effects of inhaling cigarette smoke and asbestos are greater in combination than the sum of individual effects. OSHA requires that workers be informed of the effects of smoking and the relationship it has with asbestos. Cigarette smoke and asbestos fibers increase the chance for lung cancer.

If lungs are already scarred from inhaling asbestos fibers, smoking with exuberance worsens conditions for the heart as well as the lungs. The heart has to work harder to get enough oxygen to the lungs. Eventually the disabled lungs work the heart to death. The heart dies because it can not get enough blood through the narrowed arteries or it did not get enough oxygen from the lungs.

It is highly recommended that all workers, especially those who work around ACM during operations and maintenance stop smoking. To find out more about smoking cessation programs, contact one of the following agencies for information:

- **National Cancer Institute**
- **American Cancer Society**
- **American Heart Association**
- **American Lung Association**
- **Office on Smoking and Health, US Dept of Health & Human Services**

**How to protect yourself:**

All workers involved in the operations and maintenance program of ACM must be trained, incorporated into the respiratory fitness and medical surveillance program as deemed appropriate, and, as well as, issued the appropriate PPE (Personal Protective Equipment).
Training:

Training provided to WFU employees of the Operations and Maintenance Program includes:

- Awareness Training
- Procedures and Hands-on Training
- Respiratory Protection Training
- PPE Selection & Use

Respiratory Protection and Medical Surveillance:

All wearers of respiratory protection devices such as half-mask respirators must be incorporated into the Respiratory Protection Program. This program will define the requirements of the user of the respirator:

- Training of the Respiratory Protection Program
- How to inspect a respirator
- How to don and doff a respirator
- How to clean a respirator
- Complete the medical questionnaire
- Complete Pulmonary Function Test (PFT)
- Fit-testing of the respirator
- Facial Hair Policy
- Medical Examination as required

Work Practices for ACM in Flooring:

Unless otherwise defined, flooring, ceiling, pipe insulation, and spray on insulation are to be considered PACM. Inspection and analysis of material must be requested prior to work. If positive for ACM, follow work practices outlined for non-abated ACM.

Sanding flooring is prohibited. Sanding is the abrading of flooring to even out the surface. Gross contamination can occur when the sanding disks break up the ACM and disperse released fibers over large area.

When stripping finishes low abrasion pads at speeds lower than 300 rpm and wet methods must be used. Stripping is defined as a wet process to remove the floor wax using liquid chemical strippers followed by use of abrasive pads.

Burnishing and dry buffing are permissible as long as the burnishing is done at speeds of 300-2,000 rpm using high speed rotary-disc machines. Floor wax must be applied to keep the disk from touching the tile. Three to five layers of wax will usually ensure that the wax, not the tile, is polished in this process so the floor does not throw up any asbestos fibers from the tile. DO NOT buff damaged flooring.
ACM Release and Clean-up Methods:

Cleaning Spills and sudden releases of material containing asbestos must be done as soon as possible. All surfaces shall be maintained as free as practicable of ACM waste and debris and accompanying dust. OSHA defines a spill of ACM as “fiber-release episode”. A fiber-release episode is any uncontrolled or unintentional disturbance of ACM resulting in visible emissions.

Floor and ceiling tiles are not friable. They cannot be reduced to dust by hand pressure when dry. Therefore, it is permissible to collect unbroken floor or ceiling tiles that have become dislodged or fallen as long as they are handled carefully and do not break. Sawing or any other abusive action to the non-friable material is not allowed. The intact tiles must be misted with water before they are placed in waste containers.

Notify the Asbestos Inspector immediately in event of a sudden release.

After removing the ACM and placing in a waste container, the area may need to be “wiped down”.

Wet Wiping:

- Immerse a disposable towel in a bucket of water and mild detergent (1 tbsp of detergent to one gallon of water).
- Wring out the towel and fold into quarters.
- Wipe the surface and refold the towel to have a clean face exposed. Do not place the towel back into the bucket of water or the water will become contaminated.
- Repeat until all faces of the towel have been used. Obtain a clean towel if more wiping is necessary.
- Dispose of the towel(s) in asbestos disposal bags.
- Contact EHS Office if the water becomes contaminated. Do not pour down the drain until checking with the EHS Department first.

Wet mops and other cloths used to pick up asbestos fibers need to be disposed of as soon as possible and placed in a labeled, sealed, and impermeable container. It is very important to keep the mops and cloths wet; do not let them “dry-out” before placing in the waste containers.

Wetting is the art method of controlling release of asbestos fibers. It is the first rule of asbestos work. Wet methods are inexpensive, generally feasible, and highly effective in controlling fiber release. When picking up floor tiles that have become dislodged and placing them in a disposal bag, mist the ACM to control the release.

Prompt disposal is KEY to minimizing fiber release when handling ACM.

Waste Collection:

ACM waste must be collected in scaled impermeable bags, or other closed containers for proper wast disposal. Place all scrap, debris, bags, containers, equipment, and clothing contaminated with asbestos in the designated bags.
Do not overfill the bags. The bags must be able to seal effectively; generally, this is 1/3 to 1/2 full. Bag asbestos wastes in labeled bags as deemed appropriate by WFU Accredited Inspectors or the EHS Department. Collapse the bags by evacuating the air from the bag with a HEPA filter as advised by the Accredited Inspectors. Twist the bag to form a neck and wrap the neck tightly with duct tape. Fold the neck of the bag over to form a loop, then wrap duct tape again around the neck and loop.

*Remember: Be sure to mist / wet the waste before placing it into a container.*

Training information is derived from the Asbestos Awareness Training for the State of North Carolina Office of State Personnel Risk Control Services Division conducted by Carl Goodwin, Director on March 29, 2000.