1. **Purpose**

   **1.1.** The purpose of this Asbestos Operations and Maintenance (O&M) Plan is to minimize the potential for exposure to airborne asbestos fibers for Washington University students, faculty and staff.

2. **Asbestos**

   **2.1.** Asbestos is a crystalline, silicate mineral that is mined from the earth and has been utilized extensively in building products, due to its high tensile strength and fire resistance. There are two fiber classes: serpentine and amphibole. Serpentine minerals have a sheet or layered structure, while amphibole fibers have a chain like crystal structure. There are five distinct fibers; however, chrysotile is the most prevalent in asbestos containing building products.

   **2.2.** Asbestos has been utilized in thousands of products including thermal system (pipe insulation), plaster, textured surfacing materials, joint compound, floor tiles, vinyl flooring, mastics, cements (transite), electrical wire insulation, electrical switchgear insulation, building siding, roofing shingles, tar paper, fire proofing materials for steel structures, fire rated doors, brake shoes, fire curtains and laboratory fume hoods. Building products installed prior to 1980 are considered presumed asbestos containing materials (PACM) until they are sampled and tested. While the use of the mineral in building materials manufactured in the United States has been reduced, only six product categories are subject to the final Asbestos: Manufacture, Importation, Processing and Distribution in Commerce Prohibitions; Final Rule:

   - Corrugated paper;
   - Rollboard;
   - Commercial paper;
   - Specialty paper;
   - Flooring felt; and
   - New uses of asbestos.

3. **Sources**

   **3.1.** Chrysotile is the primary form of asbestos mineral utilized in building products. Asbestos is no longer mined in the United States; however, imports from Canada account for the majority of the U.S. consumption. China, Russia and Kazakhstan are also major producers of asbestos. The annual tonnage of asbestos mined worldwide continues on a slow decline, for health reasons.

4. **Potential Health Effects**

   **4.1.** Practically everyone has been exposed to asbestos fibers, since the mineral has been utilized so extensively in common products. The mineral fiber does not present a health hazard unless it becomes “friable.” If a dry material, which contains greater than one percent asbestos, is capable of being crumbled, pulverized or reduced to a powder by hand pressure (friable) it
should be treated as potentially hazardous and as regulated material. The exposure conditions that are correlated with disease have not been clearly identified; however, the very thin asbestos fibers, such as chrysotile are more respirable due to their size. Most man-made fiberglass and ceramic insulation products have thicker fibers and the epidemiological data does not suggest as great a potential health risk. Disease related to asbestos exposure has a latency period of 10-40 years and follows a dose response curve - the greater and more chronic the exposure, the greater the potential for asbestos related illness.

4.2. Asbestosis is a scarring of the lungs caused by the mineral fibers, which reduces the oxygen and carbon dioxide exchange during respiration. Lung cancer is a malignant tumor of the bronchi surface. Mesothelioma is a cancer of the lining of the chest and abdominal wall (pleura).

4.3. The Occupational Safety and Health Administration have established an eight hour time weighted average exposure limit of 0.1 fibers per cubic centimeter of air. The excursion limit for a 30-minute period should not exceed 1.0 fibers per cubic centimeter of air. The airborne concentration limit inside a respirator should be less than 0.01 fibers per cubic centimeter of air.

5. Regulatory Requirements

- Title 29 Code of Federal Regulations - Part 1926.1101, Asbestos Construction Standard;
- Toxic Substance and Control Act (TSCA);
- National Emission Standards for Hazardous Air Pollutants (NESHAP), Title 40 CFR-Part 61;
- Asbestos: Manufacturing, Importation, Processing and Distribution in Commerce Prohibitions; Final Rule;
- Environmental Protection Agency Worker Protection Rule;
- USEPA Asbestos School Hazard Abatement Reauthorization Act (AHERA);
- Model Accreditation Plan (MAP); and
- Missouri Department of Natural Resources (MoDNR) and St. Louis County Regulations.

6. Inspection and Re-inspection

6.1. The Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) and Missouri Department of Natural Resources (MoDNR) require that asbestos containing building products be identified by an Asbestos Hazard Emergency Response Act (AHERA) trained and Missouri licensed inspector. The inspector should identify the locations, amount (linear or square footage), condition and the following types of asbestos containing building materials (ACBM):

- Surfacing materials;
- Thermal system insulation (TSI);
- Miscellaneous materials; and
- Presumed asbestos containing building materials.
6.2. Re-inspections shall be conducted at three-year intervals by Missouri state licensed inspectors.

7. Employee Awareness and Training

All employees with the potential for exposure to asbestos fibers in their work environment shall receive basic awareness training. There are also specific AHERA training requirements for operations/maintenance personnel, abatement workers, supervisors, inspectors, air monitoring professionals, management planners and project designers, under OSHA and AHERA regulations. Washington University asbestos awareness training is available through the Environmental, Health and Safety Department.

8. Responding to Potential Disturbances

8.1. University custodial and maintenance staff are not trained to perform operations/maintenance or asbestos abatement operations and all work shall be performed by independent, licensed contractors. Routine custodial or maintenance activities should not significantly disturb asbestos containing building materials.

8.2. One of Washington University’s third-party oversight contractors (Farmer Environmental or Professional Services Industries (PSI) shall be immediately contacted regarding the disturbance of asbestos containing materials in public areas, so inspection and air monitoring may be performed.

8.3. A disturbance of more than three linear feet or three square feet of ACM is considered a major release, according to AHERA requirements for public schools K-12. A “release to the environment” which exceeds one pound is a “reportable quantity,” under the Comprehensive Environmental Response Compensation Liability Act and requires notification to:

- National Response Center- (800) 424-8802;
- Missouri Department of Natural Resources- (573) 634-2436;
- St. Louis County- (314) 628-5400; and
- City of St. Louis- (314) 289-1900.

“EPCRA Section 313(g)(1) broadly defines "release" to mean "any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment. EPCRA Section 329(8) states “environment” to include water, air and land and the interrelationship which exists among and between water, air, and land and all living things. EPA interprets "release" to include the land-based disposal of toxic chemicals given the definition of “release” includes a wide variety of activities and the encompassing definition of "environment" includes the land, both surface and subsurface.” Issue Paper- Section 5 of the Form R With Regard to the Definition of Release, USEPA, 1997.

9. Operations and Maintenance Activities

9.1. An effective Operations and Maintenance Program contains the following elements:

- ACM notification;
- A visual record of the type and location of known or assumed ACM within the building or facility;
- Training on a number of levels;
- Specialized cleaning procedures;
• Maintenance work permit system;
• Special work practices;
• Emergency response procedures;
• Periodic ACM surveillance;
• Contractor management; and
• Recordkeeping.

9.2. All buildings/structures at Washington University facilities shall be inspected for asbestos containing building materials. The inspections shall be conducted by Missouri licensed inspectors at three-year intervals. Inspectors shall submit computer aided designs of asbestos containing building materials on CD's and detailed written inspection notebooks for each building/structure, prior to receiving payment. All inspections and the associated documentation shall be produced in accordance with AHERA requirements. This information shall be maintained at the affected Facilities Maintenance Departments and Environmental Health and Safety Department.

9.3. Each Facilities Maintenance Department shall evaluate the asbestos survey hazard potential assessments and select one of five USEPA recommended control options for the identified asbestos containing building materials:

• Operations and Maintenance (prevention);
• Repair;
• Encapsulation;
• Enclosure; and
• Removal.

9.4. Prior to the initiation of any maintenance, demolition or renovation activities the asbestos inspection for the affected building shall be reviewed by maintenance staff.

9.5. Asbestos containing building materials that may be potentially disturbed as a result of the maintenance, demolition or renovation activities should first be abated by a Missouri Licensed contractor. Washington University has a continuing service agreement for both abatement and third-party oversight contractors.

9.6. ACM disturbances which exceed 16-linear feet or 10-square feet require MoDNR NESHAP notification 10-days in advance of the anticipated abatement project.

9.7. OSHA has varying employee protection guidelines, dependent on the Class of abatement activities being performed. Below are the OSHA definitions for abatement operations:

• Class I asbestos work means activities involving the removal of TSI and surfacing ACM and PACM;
• Class II asbestos work means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheathing, roofing and siding shingles, and construction mastics;
• Class III asbestos work means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed; and
• Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

9.8. Prior to selecting contractors to receive the Request for Proposals, the maintenance staff shall review the pre-qualifications of the contractor to include but not be limited to:

• University Purchase Order contract and indemnification/hold harmless agreement;
• University Risk Management insurance requirements including environmental, errors and omissions coverage, claims-made vs. occurrence coverage;
• OSHA 300 log;
• Regulatory agency citation and/or notice of violation history; and
• Environmental, Health and Safety Written Program.

9.9. Third-party Missouri licensed air monitoring consultants shall be selected by the maintenance staff in the same manner. Third-party consultants are required for all abatement jobs conducted on Washington University owned properties. Washington University has a continuing service agreement with both Farmer Environmental and Professional Services Industries (PSI) to conduct this type of work.

9.10. All asbestos abatement work at Washington University facilities shall be performed in strict accordance with applicable state, federal and local regulations. It shall be the responsibility of the contractor to adhere to these regulations. At the discretion of the University, contractors found in non-compliance may be released from further contractual services.

9.11. Contractors shall be furnished with all relevant asbestos inspection reports.

9.12. Abatement and third-party air monitoring contractors, which are required for all abatement jobs at Washington University, are required to submit project close out documentation to Washington University, prior to invoicing. At a minimum the documentation should include copies of:

• NESHAP Notification(s);
• Copies of Missouri contractor, supervisor, worker and air monitoring professional certificates;
• Laboratory air sampling results for personnel, enclosure perimeter and clearance air monitoring; and
• Invoicing which reflects the location, linear or square feet of asbestos containing material removed.

9.13. All new construction projects shall specifically state in the Request for Proposals and Project Specifications that no asbestos containing building materials shall be utilized.

9.14. Good housekeeping procedures are one of the primary objectives of an effective operations and maintenance program. Walls, non-carpeted floors and other smooth surface asbestos containing materials should be routinely cleaned utilizing wet methods (liquid cleaners, water or amended water). Carpets and HVAC systems should be cleaned utilizing HEPA vacuums or steam vacuum cleaners. Care should be taken to ensure that the ACM is cleaned only and not disturbed.
9.15. Routine maintenance activities such as changing light fixtures/electrical switches, plumbing, HVAC systems, installing woodwork and room preparation for painting can potentially disturb asbestos containing materials. The most recent building/structure survey should be consulted for an ACM determination. An approved abatement contractor shall be utilized for all significant ACM disturbances. All circuits should first be de-energized when working with electrical systems, in accordance with the Washington University Lock Out Tag Out program. Wet cleaning rags or water spray bottles should be utilized to control any potential ACM releases.

9.16. The Environmental, Health and Safety Department should be contacted as part of the due diligence process, prior to the purchase of University real estate, to perform potential asbestos, lead base paint and environmental liability surveys.

10. Asbestos Containing Material Disposal

10.1. The affected Facilities and Maintenance Department shall consult the Environmental, Health and Safety Department regarding approved asbestos containing material disposal facilities. All manifesting, labeling and transportation University and regulatory agency requirements for ACM shall be adhered to by the contractor.

11. Recordkeeping Requirements

11.1. All Washington University and contractor air monitoring and personnel exposure records shall be maintained for 30 years.

11.2. The following ACM operations and maintenance records shall be maintained:

- A copy of the current written Operations and Maintenance Plan;
- Building CAD drawings;
- Asbestos surveys and periodic inspections;
- Visual records of the locations and types of ACM or PACM;
- Copies of employee/contractor warning and notification programs;
- Employee/contractor training records;
- Documentation of emergency response actions; and
- All abatement project contractor submittal documentation.