



ASSET MANAGEMENT, INC.

ASBESTOS OPERATIONS & MAINTENANCE PLAN

PREPARED BY:

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I.0 INTRODUCTION

I.1 General

This Operations and Maintenance (O&M) plan was developed for the owners, employees, and occupants of Villas of Pine Ridge located at 3110 Towne Park Drive in Tyler, Texas (herein the Subject Property) for their use in managing suspect, assumed or known asbestos-containing materials (ACMs) in the building(s) [Refer to Section 3.7 for definition of terms]. The purpose of this Plan is maintenance of suspect, assumed, or known ACMs in their existing condition.

This O&M Plan specifies procedures for suspect, assumed and known ACMs. Within this O&M Plan, procedures specified for ACMs (generally) also apply to suspect and assumed ACMs. The sole term of ACM is frequently used for simplicity and to avoid repeated use of “suspect, assumed, or known ACM”.

Existing friable asbestos hazard conditions must be addressed by remediation procedures which are beyond the scope of this O&M Plan. Such remediation activities should be conducted by licensed asbestos contractors. Nonetheless, the Facility Asbestos Coordinator should ensure that activities of asbestos contractors follow applicable regulatory requirements and guidelines.

This Plan has been designed to minimize the risk of human exposure to asbestos fibers and asbestos fiber release during general work activities, scheduled maintenance and renovation of the building. This Plan will be in effect until all the ACMs have been removed from the facility.

This O&M has been developed to cover all asbestos maintenance procedures and may contain information not applicable to the Subject Property owners, occupants, and employees. Sections of this O&M Plan (i.e. sections 4.8-Medical Surveillance and Respiratory Protection Programs and 4.9-Personal Protective Clothing) may only be applicable if “in-house” ACM abatement work is undertaken.

I.2 Statement of Policy

Company policy dictates that personnel or tenants should not engage in the disturbance of asbestos-containing material (ACM), suspect or assumed ACM. The intent of this O&M Plan is to enable maintenance personnel to perform routine maintenance activities, housekeeping activities, and activities to clean up asbestos dust, waste, and debris without technically ‘disturbing’ ACM or assumed ACM. In the event that ACM is to be disturbed or removed, maintenance personnel will notify the Facility Asbestos Coordinator who will in turn notify a licensed asbestos abatement contractor.

This plan is based upon normal work activities necessary to maintain the facilities in good condition without disturbing ACM, suspect or assumed ACM.

I.3 Objectives

The primary objectives of an effective O&M are:

- 1) To minimize the future release of asbestos fibers.
- 2) To maintain the asbestos-containing materials in sound condition.
- 3) To monitor the condition of the asbestos-containing materials.
- 4) To provide for the identification and immediate remediation of asbestos hazardous conditions.

I.4 Benchmarks of an Effective Operations and Maintenance Plan

For an O&M to be effective, it must be fully implemented at all levels of management and by a single individual who manages any and all activities involving ACM.

I.5 Operations and Maintenance Plan Elements

This O&M is comprised of the following elements:

- 1) Building occupant, tenant and employee notification.
- 2) Provisions for labeling, where appropriate, the asbestos-containing materials.
- 3) Employee training.
- 4) Works permit system to ensure that employees, tradesman and contractors do not inadvertently come in contact with asbestos-containing materials.
- 5) Special work practices allowing trained personnel to safely perform maintenance and cleaning operations involving ACM with the potential to release asbestos fibers.
- 6) Procedures to effectively combat fiber release episodes.
- 7) Employee protection and medical surveillance programs.
- 8) Periodic surveillance of the asbestos-containing materials remaining in place to ensure that they are in stable condition.
- 9) A record-keeping system.

I.6 Facility Survey

The Subject Property is currently improved with a 148-unit multifamily residential complex, including 37 one-story, concrete slab on grade apartment buildings. Additional structures include a one-story administrative leasing office and a one-story maintenance/laundry building. There are no basements present beneath the existing structures. The existing improvements were reportedly constructed in 1997.

On January 4, 2016, EBI Consulting (EBI) of Burlington, Massachusetts, conducted a Phase I Environmental Site Assessment (ESA) of the Subject Property. Note that at the time of the EBI inspection, a comprehensive asbestos survey was not conducted at the Subject Property.

EBI observed the following suspect ACMs at the Subject Property: textured ceiling materials, textured paint, wallboard/joint compound composite material, vinyl floor tile and associated mastic, sheet vinyl flooring and associated mastic, various construction mastics and caulking, and roofing materials.

Due to the continued manufacture and distribution of a wide variety of asbestos-containing building materials, asbestos may be present in the materials listed above as well as some of the roofing, flooring, caulking/putties, adhesives, spackling compounds, and/or non-accessible insulation materials at the Subject Property. Sampling of these types of materials require techniques that may be destructive to subject facilities, and in the case of roofing material, may void warranties. In accordance with Federal and State of Texas regulation, all such suspect asbestos-containing materials must be sampled and analyzed for asbestos content prior to renovation or demolition activities that could disturb the materials; or the materials must be treated as asbestos containing. Any testing, removal, or disturbance of ACM should be handled in compliance with federal, state, and local regulations and performed by State of Texas

appropriately licensed individuals. Licensed, qualified asbestos abatement personnel should be retained prior to demolition or renovation of subject facilities.

Based on EBI's limited scope of work, sampling of suspect ACMs was not performed. EBI's assessment shall not be used for determination of ACMs and non-ACMs per EPA, OSHA, and State and local regulatory requirements. Asbestos inspection shall be performed in full compliance with EPA, OSHA, and applicable State and local standards for determination of ACMs and non-ACM prior to any and all renovation, demolition, or other activity that will cause a material disturbance of suspect ACM. All materials referenced above shall be treated as suspect or assumed ACM. Any materials similar in appearance to the suspect ACMs discussed above shall be treated as suspect or assumed ACM. Additional suspect ACMs may be present at the Subject Property that were not identified as part of EBI's limited scope of work: such as the list of building materials included in Section 2.1. All such suspect ACMs at the Subject Property shall be treated as ACM unless sampled by an Asbestos Consultant, analyzed for asbestos content, and reported by the Consultant to be non-ACM. All such materials should be managed under the O&M Plan.

For the purpose of this O&M Plan, any suspect ACMs encountered in the future will be considered ACM unless inspected and sampled by an Asbestos Consultant and reported to be non-ACM.

No suspect ACM shall be disturbed or involved in any work, in any way, unless sampled by an Asbestos Consultant, analyzed for asbestos content, and reported by the Consultant to be non-ACM.

I.7 O&M Plan Implementation Overview

This O&M Plan is established with the intent of managing ACMs as follows:

1. Abate any existing asbestos hazards utilizing a State of Texas licensed asbestos abatement contractor.
2. ACMs in fair to good condition will be maintained in-place in their existing condition.
3. Establish procedures to minimize and/or avoid ACM disturbance.
4. Contract asbestos removal activities prior to any maintenance/repair, renovation, or other activities that may cause an asbestos disturbance. [In-house asbestos abatement capabilities can be established. However, this is not within the scope of this O&M Plan report. Guidance for in-house asbestos work can be obtained upon O&M worker training and State of Texas O&M Contractor license requirements or can be provided by EBI as a supplement to this O&M report.]

Listed below is a checklist of the programs and/or procedures that should be implemented as part of this O&M Plan. These programs/procedures include immediate and on-going activities for proper management of ACMs at the Property. Upon implementation of the O&M Plan, the Facility Asbestos Coordinator should be able to check off each of the activities listed within the **O&M Implementation Checklist**. Within the **O&M Implementation Checklist**, references are made to report section(s) which provide further description.

O&M IMPLEMENTATION CHECKLIST

The Facility Asbestos Coordinator should check that each of the activities/programs listed below has been completed or is implemented on an on-going basis.

- ___ **Facility Asbestos Coordinator (Coordinator) Training** – Minimum two day training or equivalent knowledge through background and experience (Section 4.4).
- ___ **Visual Reinspection of Property** by the Coordinator after completion of O&M training (Section 4.10).
- ___ **Initial Clean-Up, Abatement, and/or Testing** of known or potential friable asbestos hazards (Section 3.5).
- ___ **Worker Training** (Section 4.4).
 - ___ **Maintenance and Custodial Personnel (if applicable)** – Awareness Training (2-Hour).
 - ___ **Maintenance Personnel (if applicable)** – O&M Worker Training (2-day), if workers conduct work that could potentially disturb ACM.
- ___ **Employee, Tenant** (if applicable), and **Contractor Notifications** (Section 4.2).
- ___ **Asbestos Labeling** (Section 4.3.2), *if necessary*.
- ___ **Signage** (Section 4.3.2), *if necessary*.
- ___ **Periodic Surveillance** procedures (Section 4.10).
- ___ **Record Keeping** procedures (Section 4.11).
- ___ **Work Control/Permit System** (Section 4.5).

2.0 ASBESTOS-CONTAINING BUILDING MATERIALS

2.1 General

Asbestos is a term used to describe a group of six naturally occurring crystalline fiber minerals. Asbestos has been used extensively throughout the world in the textile, insulation and building industries. It is readily available from vast deposits in the earth; has excellent thermal stability; and has a high degree of tensile strength. Due to these excellent properties, millions of tons of asbestos have been mined since the turn of the century. Asbestos has been used as a component in fireproofing, decorative coatings, insulation materials, and as reinforcement for plasters binders in building products.

Asbestos was used extensively in the construction industry until the late 1970's. However, since the early 1970's, public awareness of the potential health hazards associated with inhalation of airborne asbestos fibers has increased. Since 1973, the U. S. Environmental Protection Agency (EPA) has limited the use of asbestos for fireproofing and insulation purposes, and in 1978, decorative uses were prohibited. Asbestos may be found in the following building materials:

Acoustical Plaster Skim Coat	Ductwork Flex Connectors	Packing Materials (at wall/ /floor penetrations)
Acoustical Plaster Base Coat	Electrical Cloth	Roofing Materials
Adhesives	Electrical Panel Board	Roofing Shingles
Asphalt Floor Tile	Electric Wiring Insulation	Rooftop Equipment Sealant
Blown-in Insulation	Elevator Brake Shoes	Sheetrock Wallboard
Boiler Insulation	Elevator Equipment Panels	Spackling Compounds
Breeching Insulation	Fire Blankets	Spray-Applied Insulation
Caulking/Putties	Fire Curtains	Stucco
Ceiling Tiles	Fire Doors	Textured Ceiling Surfacing
Cement Pipes	Fireproofing Materials	Textured Paints/Coatings
Cement Siding	Floor Backings	Thermal Paper Products
Cement Wallboard	Heating/Electrical Ductwork	Thermal Taping Compounds
Chalkboard	HVAC Duct Insulation	Transite Panels
Construction Mastics (floor tile, carpet, ceiling tile, etc.)	High Temperature Gaskets	Vinyl Floor Tile
Cooling Towers	Joint Compound	Vinyl Sheet Flooring
Decorative Plaster	Laboratory Hoods/Table Tops	Vinyl Wall Coverings
	Pipe Insulation	

Asbestos-containing building materials are generally classified as friable or non-friable. Friable materials are those which can be crumbled, pulverized or reduced to powder by hand pressure or by normal use or maintenance and emits or can be expected to emit asbestos into the air. As an example, vinyl asbestos floor tile is generally considered non-friable until it is mechanically removed from the substrate. At that time, it may be considered friable.

2.2 Medical Aspects

Asbestos fibers enter the body via inhalation of airborne particles or by ingestion and can become imbedded in the tissues of the respiratory or digestive systems. Excessive inhalation can cause a pneumoconiosis condition known as asbestosis, an emphysema-like condition. Medical research has indicated that even inhalation of asbestos fibers at the lowest detectable limits can cause other diseases such as lung cancer, pleural mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering lungs and body organs, and gastrointestinal cancer.

2.3 Regulatory Aspects

Occupational Safety and Health Administration (OSHA) began regulating exposure to asbestos in general industry in 1972. Housekeeping work not related to a construction activity is regulated by the “General Industry Standard (Title 29 Code of Federal Regulations (CFR) Part 1910.1001). These provisions cover routine cleaning in public and commercial buildings where construction activities are not taking place. Housekeeping work related to a construction activity is regulated by the “Construction Standard” (Title 29 CFR Part 1926.1101). For the Subject Facility, construction activities are most likely Class IV Asbestos work. Class IV is defined as maintenance and custodial activities during which employees contact, but do not disturb ACM.

Emissions of asbestos to ambient air are controlled by Section 112 of Clean Air Act which established National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR 61). NESHAPS regulations require filing of notices prior to the commencement of asbestos abatement activities.

Additional information regarding Federal regulatory requirements can be obtained on the USEPA Asbestos website (<http://www.epa.gov/asbestos/index.html>) and the U.S. Department of Labor OSHA website (<http://www.osha.gov/SLTC/asbestos/standards.html>).

The Texas Asbestos Health Protection Rules (TAHPR) were approved and became effective on October 20, 1992. The TAHPR established the procedures and means to implement the provisions of the Texas Administrative Code – Title 25, Part 1, Chapter 295, Occupations Code. The purpose of the TAHPR is to establish the means of control and minimization of public exposure to airborne asbestos fibers by regulating asbestos disturbance activities in buildings that afford public access or occupancy.

The TAHPR require that a person must be appropriately licensed or registered to engage in asbestos abatement or any asbestos-related activity.

TAHPR has different requirements for the Public portions of the building versus the Industrial portions which are explained in 295.31 through 295.73.

Additional information regarding Texas regulatory requirements can be obtained on the Texas Department of State Health Services website at <http://www.dshs.state.tx.us/asbestos/rules.shtm>.

3.0 ASBESTOS MANAGEMENT PLAN

3.1 General

Upon discovery of ACM in a facility, the building owner develops an asbestos management plan to effectively control the asbestos-containing materials in order to prevent an inadvertent release and human exposure to asbestos fibers.

The asbestos management plan and consequent abatement options are developed by review of asbestos survey results as well as health and safety of the building occupants. The asbestos management plan considers the hazard assessment of the asbestos containing material, the short and long-term costs of abatement options, and the expected life of the facility.

Generally, there are four alternatives for asbestos management that can be used in conjunction.

- 1) Remove the asbestos-containing materials.
- 2) Encapsulate the asbestos-containing materials.
- 3) Enclose the asbestos-containing materials.
- 4) Implement an Operations and Maintenance Plan (O&M).

3.2 Removal

The major advantage of removing asbestos-containing materials is that potential exposure is ended and the development of future problems is prevented. Therefore, removal is the most complete solution. The main disadvantage to the removal option is the cost and time for removal of ACM and replacement of substitute material. However, if the material is friable, deteriorating, damaged or accessible by employees or tenants, removal is generally the most appropriate option. Removal must be performed by trained personnel. As such, removal should be performed by a licensed asbestos contractor.

3.3 Encapsulation

Encapsulation involves coating the ACM with a sealant to bind the asbestos fibers and other components together. Encapsulation reduces the risk of fiber release and increases ACM's resistance to damage. The initial cost of encapsulation may be lower than removal; however, an O&M must be implemented and remain in effect until the asbestos-containing materials are finally removed. With encapsulation, the source of the hazard remains in the building and must be considered when planning renovation, maintenance, or demolition activities. In addition, encapsulation can make subsequent removal more difficult and hazardous since it creates a hard-crusted surface that cannot easily be wetted to facilitate removal. The placement of a second (non-asbestos) layer of floor tile over the existing asbestos containing floor tile is a form of encapsulation. Note that encapsulation is considered an abatement activity and must be done by trained personnel (see section 4.4).

3.4 Enclosure

Enclosure involves the construction of an air-tight barrier around the asbestos-containing materials. Carefully constructed airtight enclosures can reduce and even eliminate release of airborne fibers into the building environment. This alternative does not require replacement of the asbestos-containing materials and usually exhibits a lower initial cost than removal. An

O&M must be implemented in the event that asbestos-containing materials remain in the building(s) and remain in effect until the ACM is removed.

3.5 Implementation of an Operations and Maintenance Plan

The Facility Asbestos Coordinator shall immediately address any damaged ACM conditions identified during EBI's assessment or inspections performed by or arranged by the Facility Asbestos Coordinator. Actions taken by the Coordinator may be self directed or based on consultation with EBI or other consulting personnel. Appropriate response actions may be as simple as restricting access to affected areas of the Subject Property to properly trained and/or protected personnel. Response actions may also include abatement (repair, removal, enclosure, etc.) of damaged material or hazardous conditions. Sampling of damaged materials may also be necessary prior to determination of appropriate response actions.

Damaged ACM conditions or any other evidence of a asbestos fiber release will be recorded. The Coordinator will immediately arrange remediation of the condition.

An O&M is a long-term management approach to managing the asbestos-containing materials remaining in place. The program is designed to clean up asbestos fibers previously released, prevent future releases by minimizing the disturbance or damage of asbestos-containing materials, and provide for continued monitoring of the condition of asbestos-containing materials. The program remains in effect until all asbestos-containing materials are removed from the building(s).

The O&M alerts workers and building occupants to the location of asbestos-containing materials, trains custodial and maintenance personnel in proper cleaning and maintenance procedures, establishes a process that assures asbestos containing material are not disturbed during building repairs and renovations, and periodically re-inspects areas with asbestos-containing materials. The Facility Asbestos Coordinator and the supervisor of the custodial staff are key participants in the O&M.

3.6 Considerations for Contracting Asbestos Work

The asbestos Work Permit System (Section 4.5) shall include contract work. Many building owners contract for at least some custodial and maintenance services. Contracts with service trades or abatement companies should include the following provisions to ensure that the service or abatement workers can and will follow appropriate work practices:

- Proof that the contractor's workers have been properly notified about ACM and suspect/assumed ACM in the owner's building and that they are properly trained and accredited (if necessary) to work with ACM.
- Copies of documentation of use of respiratory protection, medical surveillance, and worker training as required by OSHA, EPA, and/or state regulatory agencies.
- Notification to building tenants and visitors that abatement activity is under way (performed by owner).
- Submission of written work practices by the vendor or contractor to the Facility Asbestos Coordinator for approval or modification. The vendor or contractor should then agree to abide by the work practices as finally accepted by the Facility Asbestos Coordinator.

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- Assurance that the contractor will use proper work area isolation techniques, proper equipment, and required waste disposal practices.
 - Historical air monitoring data for representative examples of the contractor's previous projects, with emphasis on projects similar to those likely to be encountered in the building.
 - Provision for inspections of the area by the owner's representative to ensure that the area is acceptable for re-entry of occupants/tenants.
 - Evaluation of resumes for each abatement contractor/supervisor or maintenance crew chief, known as the "competent person" in the OSHA standard and EPA Worker Protection Rule.
 - Criteria for determining successful completion of the work (i.e., visual inspections and air monitoring).
 - Notification to EPA (and other appropriate agencies) if the abatement project is large enough to trigger asbestos NESHAP or State or local requirements.
 - Any other information deemed necessary by the owner's legal counsel.

3.7 Definitions

Aerosol: A system consisting of particles, solid or liquid, suspended in air.

Air Cell: Insulation normally used on pipes and ductwork that is comprised of corrugated cardboard which is frequently comprised of asbestos combined with cellulose or refractory binders.

Air Monitoring: The process of measuring the fiber content of a specific volume of air.

Amended Water: Water to which a surfactant has been added to increase the ability of the liquid to penetrate asbestos.

Asbestos: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite, amosite, anthophyllite, and actinolite-tremolite. For purposes of determining respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

Asbestos-Containing Material (ACM): Any material containing more than 1% of asbestos of any type or mixture of types.

Asbestos-Containing Waste Material: Any material, which is or is suspected of being or any material contaminated with an asbestos-containing material that is to be removed from a work area for disposal.

Asbestos Consultant: Person and/or company currently accredited and/or licensed as an asbestos inspector in accordance with EPA and applicable State and local regulations.

Assumed Asbestos-Containing Material: Any suspect ACM that has not been appropriately tested to confirm whether or not it contains asbestos.

Authorized Visitor: The Owner's Representative or his designee, testing lab personnel, the Architect or a representative of any federal, state and local regulatory or other agency having authorizing over the project.

Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.

Certified Industrial Hygienist (C.I.H.): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.

Class I Work (OSHA): Work activities, performed by an outside licensed abatement contractor, that involve the removal of boiler, pipe and duct insulation, and surfacing material such as spray-applied fireproofing.

Class II Work (OSHA): Work activities, performed by an outside licensed abatement contractor, that involve the removal of asbestos-containing materials other than boiler, pipe and duct insulation, and surfacing material such as spray-applied fireproofing.

Class III Work (OSHA): Work activities that involve the repair of minor amounts of damaged asbestos-containing materials.

Class IV Work (OSHA): Work activities that involve the maintenance and custodial activities during which tenants and employees contact but do not disturb asbestos-containing materials or presumed ACM. Class IV work may involve the clean-up of dusts, wastes and debris in areas where asbestos is, was or may be located.

Critical Barrier: Airtight barrier, usually of sheet plastic, which separates the contaminated work area from any other air space. Installed first, these barriers cover items such as, but not limited to: windows, doors, HVAC components, floor drains and containment walls that are not at existing building walls.

Decontamination: Wet cleaning and HEPA vacuuming of all work area surfaces to remove all visible debris prior to the final visual inspection, encapsulation and testing of the containment.

Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.

Disposal Bag: A properly labeled 6 mil thick leak-tight plastic bag used for transporting asbestos waste from work and to disposal site.

Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

Bridging encapsulant: an encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

Penetrating encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

Removal encapsulant: a penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.

Encapsulation: Treatment of asbestos-containing materials, with an encapsulant.

Enclosure: The construction of an airtight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

Fiber Release: Any uncontrolled or unintentional disturbance of ACM resulting in visible emission.

Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.

Fitting: Within any piping system, any valve, tee, elbow, 45°, flange, union, reducer, or other piping connector which may be insulated with asbestos.

Friable Asbestos Material: Material that contains more than 1.0% asbestos by weight, and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

Glovebag: A sack (typically constructed of 6 mil transparent polyethylene or polyvinyl chloride plastic) with two inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.

HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.

HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be 99.97% efficient for retaining fibers of 0.3 microns or larger.

High-Efficiency Particulate Air Filter (HEPA): A filter which removes from air 99.97% or more of monodisperse dioctyl phthalate (DOP) particles having a mean particle diameter of 0.3 micrometer.

Industrial Building: Any building where industrial or manufacturing operations or processes are conducted and to which access is limited principally to employees and contractors of the facility operator or to invited guests under controlled conditions.

Lock-out: Installation of a locking device to prevent activation of an electrical circuit, which has been deactivated for safety reasons. Always utilized in conjunction with tag-out procedures to advise who has deactivated the circuit and in compliance with OSHA 1910.147, "Control of Hazardous Energy Source."

NESHAP: National Emission Standard for Hazardous Air Pollutants, 40 CFR Part 61 Subpart M.

Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

Negative Pressure Ventilation System: A pressure differential and ventilation system.

Personal Monitoring: Sampling of the asbestos fiber concentrations within the breathing zone of an employee.

Plastic Barrier: Sheet plastic barrier installed after critical barrier that protects building components and non-movable objects from water damage and asbestos contamination. The primary barrier is normally two independently attached plastic sheets.

Pre-Cleaning: Wet cleaning and HEPA vacuuming of work area surfaces prior to the installation of polyethylene sheeting and the construction of containment.

Presumed Asbestos-Containing Material (PACM): Thermal systems insulation, surfacing material or miscellaneous materials found in buildings constructed prior to 1980 that has not been appropriately tested to confirm whether or not it contains asbestos.

Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

Public Building: The interior space of a building used or to be used for purposes that provide for public access or occupancy, including schools, hospitals, prisons and similar buildings. Interior space includes exterior hallways connecting building, porticos, and mechanical systems used to condition interior space. The term includes any such interior space during a period of vacancy, including the period during preparations prior to actual demolition. This term does not include: a federal building or installation; a private residence; an apartment building with no more than 4 dwelling units; a manufacturing facility that is limited to workers and invited guests; an industrial facility to which access is limited principally to employees of the facility because of processes or functions that are hazardous to human safety or health; or a building or portion of a building which has become structurally unsound.

Repair: Returning damaged ACM to an undamaged condition to prevent fiber release.

Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres. Must be approved by NIOSH and used in accordance with the employer's respiratory protection program and all manufacturer's procedures.

Secondary Barrier: Sheet plastic "drop cloth" installed on floors and/or walls of containment during removal activities to protect primary layers.

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

Surgical Removal: A process by which small amounts of asbestos are removed with extreme care from substrates to which critical barriers or other seals are to be applied. This process usually involves scraping with small hand tools directly into the inlet of a HEPA vacuum.

Suspect Asbestos-Containing Material (Suspect ACM): The term "suspect ACM" is used by the asbestos industry to refer to any building material that is suspected of being asbestos-containing (based on appearance, usage, age of building, etc.), but has not been proven conclusively to be ACM (based on sampling and analysis). Suspect material would include any material that a building owner suspects of containing asbestos and is found in a building of any age or construction date. Refer to section 2.1 for a list of typical suspect ACMs.

Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos contaminated waste.

Work Area: The area where asbestos related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust, fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

4.0 OPERATIONS AND MAINTENANCE PLAN

4.1 Program Management

4.1.1 Overview of O&M Plan

Key Personnel

Facility Asbestos Coordinator:

Company: _____

Address: _____

Name / Title: _____

Phone Number (Direct / Mobile): _____

Asbestos Response Team:

Company: _____

Address: _____

Name / Title: _____

Phone Number (Direct / Mobile): _____

Asbestos Abatement Contractor – Asbestos Removal, Disposal, or Emergency Response: *

Company: _____

Address: _____

Name / Title: _____

Phone Number (Direct / Mobile): _____

Asbestos Consultant – Asbestos Sampling and Analysis:

Company: EBI Consulting

Address: 21 B Street, Burlington, MA 01803

Name / Title: Mike Walther, Program Director (Asbestos-Lead-Mold Programs)

Phone Number (Corporate / Direct / Mobile): 800-786-2346 / 410-696-2565 / 410-370-7577

*- Lists of Texas licensed asbestos inspectors and abatement contractors can be obtained on the Texas Department of State Health Services website at <http://www.dshs.state.tx.us/asbestos/locate.shtm>.

4.1.2 Facility Asbestos Coordinator

The Facility Asbestos Coordinator is the individual responsible for managing the overall O&M and acts as the decision-maker on all routine, as well as emergency, asbestos-related matters. The person selected as the Facility Asbestos Coordinator should be involved with, aware of, or oversee daily operations at the Subject property. It is recommended that this person be someone who is on site during operational hours.

The Facility Asbestos Coordinator should obtain advice from relevant parties such as the company physician, attorney, consultant, and contractors when facing abatement or monitoring needs. The Facility Asbestos Coordinator is, however, ultimately responsible for overseeing all aspects of the program. These include:

-
- 1) Providing information on the asbestos-containing materials.
 - 2) Notifying employees and occupants of the presence, and management protocol for, asbestos-containing materials remaining in place.
 - 3) Labeling asbestos-containing materials remaining in place.
 - 4) Training workers.
 - 5) Implementing and managing a work permit system.
 - 6) Supervising special work practices.
 - 7) Controlling of fiber release episodes.
 - 8) Managing employee protection and medical surveillance programs.
 - 9) Conducting periodic surveillance of the asbestos-containing materials remaining in place.
 - 10) Maintaining the record-keeping system.

4.1.3 Asbestos Response Team

When asbestos-containing materials have the potential to be disturbed because of repairs, renovation or demolition, the Facility Asbestos Coordinator will be notified. If in-house workers will perform the action, then the Facility Asbestos Coordinator will utilize the specially trained staff that makes up the Asbestos Response Team to perform the work. Their actions will be guided by the procedures provided in this document and good construction practice.

When asbestos fibers are inadvertently released, the Facility Asbestos Coordinator will be notified. The coordinator will utilize the Asbestos Response Team to contain the area, eliminate the fiber-producing source, and clean the area.

4.1.4 Maintenance/Custodial-Staff

Maintenance/Custodial employees are generally the most familiar with the facility and are therefore most likely to notice a change in material condition within the Subject Property building(s). Also, these employees are most likely to be given the direct responsibility of minimizing the potential for airborne fiber release and thus are the key individuals to implement a functional Operations and Maintenance Plan.

To ensure an adequate level of knowledge of asbestos-related procedures, a two-tiered training program for the maintenance and custodial staff will be conducted. (refer to Section 4.4)

4.2 **Awareness Program**

The Facility Asbestos Coordinator is responsible for fulfilling all notification requirements mandated by regulatory agencies. Written notification shall be provided within 30 days of establishing the O&M Plan and at the time of lease. Update notifications shall be provide annually if there is a change to the ACM inventory. The notification shall include instructions to report damage of ACMs to the building management. Building occupants shall also be notified of renovation and O&M activities that may impact ACMs, if such work will be conducted in areas potentially accessible to employees or commercial tenants. Consideration can be given to notification of residential tenants. Section 4 of the EPA Green Book (*Managing Asbestos In Place, A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials*) includes information on occupant, tenant and worker notification of the presence of ACM that might be helpful to the Facility Asbestos Coordinator.

Commercial tenants shall be notified; and tenants are required to notify their employees. Owners and tenants are required to notify contractors or employees. All persons who perform repair, maintenance, or other work within the building shall be informed of the presence, location, and quantity of materials that contain or are presumed to contain asbestos. Notifications concerning the locations of ACM should be given to all employees during Asbestos Awareness training.

The Hazard Communication requirements of the OSHA Asbestos in Construction Standard (29 CFR 1926.1101(k)) contain mandatory notification requirements. Prior to the performance of work, all persons that will be directly or indirectly affected by the ACM work must be notified. The Facility Asbestos Coordinator shall notify the following persons:

- Prospective employers applying or bidding for work whose employees reasonably can be expected to work in or adjacent to areas containing ACM/PACM.
- Employees of the owner who will work in or adjacent to areas containing ACM/PACM (Maintenance and Custodial personnel).
- On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing ACM/PACM.
- Employers of employees (commercial tenants) who will occupy areas containing ACM/PACM.

The Facility Asbestos Coordinator shall notify all personnel through written correspondence or through verbal communications. However, written documentation of all notifications shall be maintained on the O&M Plan files.

The following information should be included in the notifications:

- ACM/PACM has been identified in the building and is located in areas where the material could be disturbed.
- The type, location, condition and quantity of the ACM/PACM, and the response that is appropriate for that condition.
- Asbestos only presents a health hazard when fibers become airborne and are inhaled. The mere presence of Asbestos within a building does not represent a health hazard.
- Do not disturb the ACM/PACM.
- Report any evidence of disturbance or damage of ACM/PACM to the Facility Asbestos Coordinator.
- Report any dust or debris that might come from the ACM or PACM, any change in the condition of the ACM/PACM, or any improper action (relative to ACM/PACM) of building personnel to the Facility Asbestos Coordinator.
- Cleaning and maintenance personnel are taking special precautions during their work to properly clean up any asbestos debris and to guard against disturbing ACM/PACM.
- All ACM/PACM is inspected periodically and additional measures will be taken if needed to protect the health of building occupants.

In addition to personnel notification, there is an U.S. EPA NESHAP requirement to notify the appropriate agency when abatement activities affect large quantities of ACM. Any notification of federal and state authorities will be handled by the asbestos contractor. Documentation verifying this notification must be kept in the office of the Facility Asbestos Coordinator.

Through the use of the acknowledgment forms provided in Appendix A, the owner of the Subject Property building(s) is demonstrating the intent to abide not only by EPA and OSHA regulations, but also by EPA and OSHA recommendations. When completed, these forms shall be maintained for 30 years.

4.2.1 Employee and Occupant Notification Letter (Form A-1)

This notification letter provides information regarding the presence of ACM and pertinent O&M procedures to appropriate employees.

4.2.2 Employee Notification Form (Form A-2)

Upon receipt of appropriate training, this notification form will be signed by employees who may work with ACM at the Subject Facility.

4.2.3 Contractor, Vendor, and Repairman Notification Form (Form A-3)

The Contractor, Vendor, and Repairman Notification Form is used to notify outside agents of the presence of asbestos-containing materials within the Subject Facility in conjunction with the Work Permit System described in Section 4.5. Notification Form A-3 is used to ensure outside agents are notified of the presence of asbestos-containing materials and that they have been informed, and acknowledge the potential hazards associated with working in the presence of ACM.

4.3 Identification and Labeling of Asbestos-Containing Materials

4.3.1 Identification

As referenced in Section 1.6, EBI's ESA identified suspect ACM at the Subject Property.

The above-referenced assessment is not a comprehensive asbestos survey and should not be relied upon as such. Additional ACMs and/or assumed ACMs may be located at the Subject Property in areas not accessed by the inspector or because of limited sampling and analysis conducted as part of the prior inspections. Therefore, additional inspection is required of any areas which may undergo renovation or demolition. Furthermore, initial or additional sampling may be necessary prior to disturbance of specific suspect/assumed ACMs.

Prior to conducting any maintenance work which may disturb any suspect ACMs, the Facility Asbestos Coordinator should determine whether any known or suspect ACM(s) will be potentially disturbed. The Coordinator should review O&M Plan records to determine whether all materials which may be disturbed have been adequately sampled and analyzed for asbestos content. If suspect ACM(s) will be potentially disturbed, the Coordinator should arrange for sampling and analyses of the suspect ACM(s) and determination of asbestos content prior to commencement of work. In lieu of sampling and analyses, suspect ACMs can be assumed to be and treated as asbestos-containing.

Determining whether any suspect ACMs will be disturbed by maintenance work, renovation, or demolition may be accomplished through review of previous inspection and sampling records. However, if insufficient data is available, inspection and possibly sampling must be conducted by a properly trained and licensed asbestos inspector or individual asbestos consultant.

Drawings depicting areas of abatement should be developed in the event that remediation activity is performed. The Facility Asbestos Coordinator shall maintain all drawings and /or plans.

4.3.2 Warning Signs and Labels

Signs and labels shall be designed, to the extent feasible, in a fashion to ensure that the desired message is communicated to the targeted audience. Signs and labels can be written in one or multiple languages to ensure comprehension. Means to ensure comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.

Additional steps may be needed for illiterate or non-English speaking workers and other occupants who may encounter language difficulties. For example, owners should consider providing information sessions in languages other than English where a significant number of workers, occupants, or visitors do not speak English. Furthermore OSHA regulations require that employers ensure employees can comprehend the warning signs posted. Owners may wish to consider developing a warning label system for illiterate workers showing them pictures about potential hazards of disturbing ACM and showing them where ACM is located. Translations of the warning labels should be provided by the owner for non-English speaking personnel.

Labeling

In order to inform Maintenance, Custodial, and other personnel of potential asbestos hazards, asbestos labeling and/or signage may be necessary at the Property. If easily damaged ACMs or assumed ACMs are present in maintenance areas of the Property, labels should be affixed directly to the ACMs or warning signs should be posted (as discussed in the following section). Easily damaged ACMs include thermal system insulation (TSI) materials, surfacing material, or any other friable materials.

If ACM labeling is conducted, then labels shall be affixed to all friable ACMs within each mechanical or other building area that is not accessible to the public, but is accessible to maintenance, custodial, or contracted personnel.

Labels must also be affixed to all containers containing such products, including waste containers, regardless of signage.

Labels shall be printed in large, bold letters on a contrasting background.

Labels shall bear the following information:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

Signage

If signage is conducted at the Subject Property in addition to or in-place of labeling, then warning signs should be posted at the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain thermal system insulation material,

surfacing ACM, or other friable ACM(s). This includes each mechanical or other building area that is not accessible to the public, but is accessible to maintenance, custodial, or contracted personnel. The Facility Asbestos Coordinator shall post signs which identify the ACMs which is/are present, its/their location, and appropriate work practices which, if followed, will ensure that ACM will not be disturbed.

No example of a mechanical room/area sign is provided since they can vary greatly, depending on the types of ACMs present.

The Coordinator should also ensure that warning signs are posted by any asbestos abatement contractors conducting work within their building(s). Warning signs that demarcate the regulated area during a response action shall be provided and displayed at each location where a regulated area is established. Signs shall be posted at such a distance from the regulated area that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

These warning signs shall bear the following information [An example sign is included in Appendix A, A-7]:

**DANGER:
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTION
CLOTHING ARE REQUIRED IN THIS AREA**

Warning signs should also be posted in building areas where construction, maintenance or remodeling work creates the potential for employees to come into contact with, release or disturb asbestos or ACM. The signs should be posted by the owner, tenant or agent responsible for the performance of or contracting for, such work.

The warning signs must read:

**CAUTION:
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
DO NOT DISTURB WITHOUT PROPER TRAINING AND EQUIPMENT**

The lettering must be in large print and in a bright color to maximize visibility. This signing requirement is separate from the notification requirement, and complying with one requirement will not satisfy the other.

4.4 Employee Training Programs

All designated employees will be required to attend formal asbestos-training programs to ensure an adequate level of knowledge commensurate with their job descriptions. All training shall meet the requirements of TAPHR for activities taking place within the public areas of the Subject Property. All training for activities taking place within the industrial areas shall comply with OSHA standards as outlined below.

A Lists of Texas licensed asbestos training providers can be obtained on the Texas Department of State Health Services website at <http://www.dshs.state.tx.us/asbestos/locate.shtm>.

4.4.1 Facility Asbestos Coordinator

The Facility Asbestos Coordinator should be properly qualified, through training and experience. Formal training is not required; but, if the designated person is not already appropriately knowledgeable and experienced, formal training is recommended. The Coordinator shall be appropriately knowledgeable of regulatory requirements pertinent to this O&M Plan: such as asbestos material identification and testing, labeling, signage, notification, periodic surveillance, and emergency response actions. The Coordinator should also be appropriately knowledgeable of asbestos handling procedures, work practices, worker protection, methods of reducing asbestos exposure, and other applicable OSHA, EPA, state and local regulations. Completion of an EPA approved 16-hour Operations and Maintenance course is an option. Other training options include EPA accreditation under the Asbestos Hazard Emergency Response Act (AHERA) or state certification as a Building Inspector/Management Planner and/or Abatement Supervisor. Four-hour to eight-hour courses are also available that are specifically designed for building owners. For all training scenarios, annual refresher training is recommended in order to stay abreast of regulatory and industry changes.

4.4.2 OSHA Class IV (Awareness)

Two hours of training is required for all custodial and maintenance personnel who may work in a building that contains either friable or non-friable asbestos-containing building materials.

Training, at a minimum, shall include information regarding:

- 1) Characterization of asbestos.
- 2) Information on health effects.
- 3) Locations of asbestos-containing materials.
- 4) Recognition of damage or deterioration of asbestos-containing materials.
- 5) Name and phone number of Facility Asbestos Coordinator.

The curriculum for this course and a suggested course schedule are in Appendix B under Level I Training.

4.4.3 OSHA Class III (Minimum Skills)

Sixteen hours of training is required for custodial and maintenance staff who conduct activities that will result in the disturbance of ACM.

Topics shall include:

- 1) Description of proper methods for handling asbestos-containing materials.
- 2) Information on use of respiratory protection.
- 3) Applicable regulations.
- 4) Hands-on training in the use of respiratory protection, other personal protection measures, and good work practices.

The curriculum for this course and a suggested course schedule are in Appendix B under Level II Training.

4.5 Work Permit System

The work permit system controls the access of maintenance personnel, vendors, contractors and others to the asbestos-containing materials that will remain in place. To the greatest extent possible, the implementation of the O&M should be incorporated into the existing system for managing work at the Subject Facility. Approval and documentation forms should parallel those in use, or the existing forms can be expanded to include the content of the forms discussed here.

4.5.1 Goal of the Work Permit

The goal of the work permit system is two-fold. First, it will ensure that personnel who may disturb asbestos-containing materials while performing maintenance, cleaning or renovation are notified of the potential hazard and have been appropriately trained. Secondly, the work permit system will demonstrate the owner's commitment to appropriate management of the asbestos-containing materials.

4.5.2 Work Permit Procedures

Designated employees shall complete a work permit for all work involving contact with ACM. The work permit will be reviewed by the Facility Asbestos Coordinator once all of the following conditions are met:

The proposed work will not affect the asbestos-containing materials remaining in place.

OR

The disturbance of the asbestos-containing materials by the accomplishment of the proposed work is understood and proper personnel and environmental precautions have been established.

AND

An Employee Notification Form (Form A-2) and/or a Contractor, Vendor, and Repairman Notification Form (Form A-3) are on file for each individual taking part in the proposed work.

AND

If the proposed work disturbs ACM, only personnel who are in medical surveillance and respiratory protection programs described in Section 4.8 and who have been trained to at least the competency of Level II described in Section 4.4 will be utilized.

For all work at the facility, the Facility Asbestos Coordinator shall ensure that the following forms (included in Appendix C) are completed:

- Work Permit Form for Maintenance Work
- Evaluation of Work Affecting Asbestos-Containing Materials
- Work Permit Log

4.5.3 Sample Work Permit

A sample work permit and work permit log are provided in Appendix C.

4.6 Maintenance Procedures

This section discusses the procedures to be followed by maintenance personnel performing maintenance and cleaning in areas where asbestos-containing materials are located and the potential to disturb the material exists. These operating procedures are to be utilized for all day-to-day maintenance activities. For all maintenance areas described in this section, air monitoring should be performed during the first few times each type of activity is performed to establish the typical level of airborne fibers. The strategy for sampling and the evaluation of results should be performed by an outside consultant specializing in asbestos abatement air monitoring and who is properly trained/licensed in accordance with TAHPR. The Special O&M Cleaning Practices described in below (in this section) may be performed by personnel with Class IV (Level I) training.

In Appendix D of this O&M Plan, procedures are presented associated with performance of small scale, short duration asbestos abatement work. The training that the maintenance personnel receive, as described in Section 4.4 (OSHA Class III (Level II)), is necessary for this small scale, short duration work. Additional requirements are also applicable such as Respiratory Protection Program and Medical Monitoring as outlined in Section 4.8.

Neither Class III (Level II) nor Class IV (Level I) training provide workers with requisite knowledge to perform full scale asbestos abatement operations. If the scope of work to be performed is greater than that defined in Appendix D as Class III or Class IV, or if a maintenance project involves the removal of ACM, then site personnel will not perform the work. Such work will require special expertise and preparation and will only be done by a licensed asbestos abatement contractor experienced in asbestos abatement procedures.

The following practices may be used in conjunction with daily activities with the appropriate Class IV (Level I) training.

4.6.1 Special O&M Cleaning Practices

Wet Cleaning: Proper O&M cleaning will involve the use of wet cleaning or wet-wiping practices to pick up asbestos fibers. Dry sweeping or dusting can result in asbestos fibers being re-suspended into the building's air and therefore should not be used. Once wet cloths, rags, or mops have been used to pick up asbestos fibers, they should be properly discarded as asbestos waste while still wet. They should not be allowed to dry out, because the collected fibers might be released at some later time when disturbed.

HEPA Vacuums: The use of special vacuum cleaners, commonly referred to as HEPA (high efficiency particulate air) vacuums, may be preferable to wet cleaning in certain situations. These vacuums are equipped with filters designed to remove very small particles or fibers—such as asbestos—by filtering those particles from the air passing through the vacuum. Because the exhaust air from an ordinary vacuum cleaner is not filtered sufficiently, it is possible for tiny asbestos fibers to pass through the filter and back into the building air.

It is important for O&M workers to use caution when emptying HEPA vacuums and changing the filters because exposures could result from such activities. Before emptying the HEPA vacuums, workers should move the HEPA vacuum to a physically isolated area of the facility and put on proper personal protective equipment before emptying the dust and debris into properly labeled, sealed, and leak-tight containers for disposal as asbestos-containing waste. When

custodial workers are not trained to work with ACM, trained maintenance workers can be used to empty the HEPA vacuums and change their filters.

4.7 Combating Fiber Release Episodes

A Fiber Release is any uncontrolled or unintentional disturbance of ACM resulting in visible emission. As long as ACM remains at the Subject Property, a fiber release episode could occur if the ACM is inadvertently disturbed. Evidence of a fiber release includes, but is not limited to, the presence of suspect asbestos-containing debris on the floor or other surface; water or other physical damage to the ACM.

Special operating procedures are needed in the event of an emergency situation where asbestos fibers are immediately released. These operating procedures are needed to limit contamination of the building environment by reducing the potential for release airborne asbestos fibers.

4.7.1 Causes of Fiber Release Episodes

Typical situations which might cause a fiber release episode are:

- 1) Fire.
- 2) Extensive water damage via a pipe break, or other means.
- 3) Construction procedures causing excessive vibrations such as coring, jack-hammering, or vibration from other mechanical devices.
- 4) Improperly executed renovations or remodeling activities.
- 5) Routine maintenance activities such as:
 - Carpet removal over asbestos flooring
 - Duct system repair or maintenance
 - Leaking pipe fitting repair
 - Accessing voids above fixed or suspended ceilings, within walls and mechanical equipment; accessing pipe and mechanical runs and chases
 - Light fixture repair
 - Thermal pipe system maintenance
 - Fluorescent bulb replacement
 - Floor buffing, sanding or grinding

4.7.2 Fiber Release Episode-Initial Response

In the event of a fiber release episode, or when it is recognized that a fiber release episode may occur, the Facility Asbestos Coordinator will notify the Asbestos Response Team. The Facility Asbestos Coordinator will proceed to the scene and take charge of the asbestos related issues until duly relieved. The Asbestos Response Team will respond and assist the facility Asbestos Coordinator in managing and controlling the fiber release episode by:

- 1) Evaluating the ACM damage.
- 2) Vacating all personnel and occupants from the immediate area.
- 3) Blocking the entrance to the contaminated areas to prevent entry by unauthorized personnel.
- 4) Turning off the air handling system in the affected area.
- 5) Isolating the affected area by closing all doors leading to the area.

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- 6) Sealing openings and penetrations to the contaminated areas (i.e. doors and vents) with polyethylene sheeting and duct tape.
 - 7) Posting warning sign at the perimeter or at entrances to the contaminated area.
 - 8) Providing for appropriate worker personnel protection (e.g., respirators, protective clothing, etc.).
 - 9) If feasible, stopping the cause of the contamination.
 - 10) Contacting the Asbestos Consultant and/or Asbestos Abatement Contractor, as applicable. All asbestos material disturbances shall be performed and/or remediated by properly trained personnel or a licensed asbestos abatement contractor. Disturbances of greater than three square or three linear feet of ACM shall be performed by the licensed asbestos abatement contractor.

4.7.3 Fiber Release Episode-Recovery

After the contaminated area has been isolated and source of contamination addressed, emergency abatement procedures may need to be implemented. Such abatement must be conducted by a properly trained/licensed abatement contractor under the observation of a properly trained/licensed asbestos consultant.

Before conducting such abatement, the asbestos consulting firm should conduct air monitoring inside and outside the contaminated area to evaluate the airborne fiber concentration. Based upon these results, a determination will be made by the building owner as to the procedure for emergency abatement and clean up of the area.

Until the contaminated area has been cleaned and prevalent level air monitoring indicates that the airborne fiber concentration is below 0.01 fibers per cubic centimeter, no employee or occupant should enter the area. If entrance to the area is required, only personnel trained in accordance with the Level II curriculum of Section 4.4, or equivalent, and respirator qualified may enter.

Following each emergency asbestos-related activity, an Emergency Abatement Form from Appendix A (Form A-5) will be completed and filed.

4.8 **Medical Surveillance and Respiratory Protection Programs**

The Facility Asbestos Coordinator shall provide respirators, and ensure that they are used, where required by this Program. Respirators shall be used in the following circumstances:

- During all repair and maintenance operations where ACM is likely to be disturbed and wet methods are not being used.
- During all repair and maintenance operations where ACM is likely to be disturbed and the Coordinator does not produce a “negative exposure assessment.”
- During all repair and maintenance operations where asbestos-containing thermal systems insulation or surfacing material is being disturbed.
- During all maintenance and custodial activities performed within regulated areas where employees performing other work are required to wear respirators.
- During all work covered by this Program where employees are exposed above the PELs.
- In emergencies.

If respirators are used, the Facility Asbestos Coordinator shall select and provide, at no cost to the employee, the appropriate respirator as specified in 29 CFR 134. All respirators shall be jointly approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH). The Facility Asbestos Coordinator shall provide a tight-fitting powered, air-purifying respiratory in lieu of any negative pressure respirator specified in the above table whenever an employee chooses to use this type of respirator and the respirator will provide adequate protection to the employee.

When respiratory protection is used, the facility must institute a respirator protection program in accordance with 29 CFR 134. A respiratory protection program must be a written program that is reviewed annually by a designated Program Administrator. The program must include, but is not limited to: engineering and administrative controls to reduce employee exposure; respirator selection criteria; medical surveillance procedures; respirator assignment, training, inspection, and maintenance procedures; and fit test procedures.

The Facility Asbestos Coordinator shall institute a medical surveillance program for all employees who, for a combined total of 30 or more days are engaged in repair and maintenance operations, where asbestos-containing material is likely to be disturbed or are exposed to airborne fiber concentrations above the PELs and for employees who wear negative pressure respirators.

To comply within the OSHA Asbestos Standard for General Industry (29 CFR 1910.1001), employees required to wear respiratory protection equipment will be enrolled in a Medical Surveillance Program; and the Employer shall have a Respiratory Protection Program. An acceptable medical surveillance program must include pre-placement, annual, and termination examinations; and the medical exam generally consists of a review of the employees history to determine the presence of any respiratory diseases as well as pulmonary function testing including FVC and FEV10, and a chest x-ray.

Subject Property owners, employees, and occupants may not currently be required to wear respirators. While the use of such respiratory protection may only be needed on an intermittent basis, a physical examination and evaluation is necessary to ensure that those designated employees are physically able to do so. Adequate medical supervision of respirator users is needed to determine the extent of individual stress tolerance and to prevent potential health problems. In the event that Subject Property owners, occupants, and employees are authorized and/or required to utilize respirators, Section 4.8 of this O&M will apply.

4.9 Personal Protective Clothing

Protective clothing for workers typically consists of disposable coveralls, gloves and boots. Coveralls should have hood and booties attached and should provide complete coverage of the body with the exception of the hands and face. Coveralls are generally made of Tyvek and are not meant to be modified.

If potential for exposure to asbestos-containing dust and debris is low and localized, workers shall use a minimum of one disposal coverall over street clothes. Where the potential for exposure to asbestos-containing dust and debris is moderate or dispersed, workers shall use a minimum of two disposal coveralls over street clothes. When possible, street clothes should be removed before protective clothing is put on. Protective clothing should be put on after donning the respirator and the coverall hood should cover the respirator straps.

Workers shall also wear protective gloves during work activities that are taped at the cuffs to the protective coveralls. Rubber slip-resistant boots are recommended for work areas where slip hazards might occur (protective booties should cover feet inside the boots). Steel toed boots, eye, hearing and head protection should also be used where needed.

Contaminated clothing shall be removed at the work site; properly wrapped and disposed. Used protective clothing shall not be taken home. Used protective clothing poses asbestos exposure risk to workers and others.

4.10 Periodic Facility Inspection

A regularly scheduled inspection plan must be implemented for all areas where asbestos-containing material(s) are located. The inspections are necessary so that prompt and appropriate action can be initiated, if necessary, before a release of asbestos fibers occurs. Inspection forms will be filled out as required after each inspection.

4.10.1 Daily

During the general activities done on a daily basis, maintenance and custodial employees should observe and become aware of the condition of the asbestos containing material in the building(s). They should document any change in the ACM such as color, separation from the applied surface, water damage, or damage due to routine maintenance procedures. When such changes are noted, the following must be implemented:

- 1) Notify the Facility Asbestos Coordinator that a change in conditions exists. Include information concerning date noted, location, cause of change (if known), size of area involved and any other information available.
- 2) The Facility Asbestos Coordinator will immediately initiate a formal inspection of the area and document the results on the Building Inspection Form found in Appendix A.

4.10.2 Semi-Annual Inspection

This inspection, conducted by the Facility Asbestos Coordinator, will be conducted of all ACM remaining in place within the facility. The goals of this semi-annual inspection are:

- 1) Determine if any change in material conditions has occurred.
- 2) Increase awareness of the program administrator.
- 3) Document that an on-going inspection process is in place.
- 4) Review of inspection record-keeping system.

The inspection should include all areas of the Subject Facility where ACM have been identified.

4.10.3 Annual Inspection

On an annual basis, the overall status of the program will be reviewed. An outside consultant, specializing in asbestos evaluation and control, should perform the inspection and audit with the assistance of the Facility Asbestos Coordinator, the Consultant will:

- 1) Inspect the building(s), noting condition of materials.
- 2) Note areas where asbestos-containing materials have been removed.
- 3) Re-define exposure potential, if necessary.

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- 4) Perform prevalent area air monitoring.
 - 5) Conduct a full review of the record keeping files, the O&M, and other administrative controls.

After the Consultant has reviewed the building(s) and the administration of the O&M, a written report of the findings of the annual inspection, with recommendations, will be provided to the Facility Asbestos Coordinator.

4.11 Record-Keeping

The following records (as applicable) of O&M work should be retained in permanent files:

- Inspection and Assessment Reports
- A copy of the O&M Plan (initial program and all updated versions)
- The Work Practices Used
- Respiratory Protection Program
- Fiber Release Reports
- Work Permit Forms
- Evaluations of Work Affecting Asbestos-Containing Materials
- Work Permit Logs
- Reinspection/Periodic Surveillance Reports
- Asbestos Waste Disposal Forms
- Air Monitoring Data
- Qualifications and Performance Records for Outside Contractors performing O&M work
- Notification forms and letters
- Emergency Abatement Forms
- Building Inspection Forms

For employers with employees engaged in asbestos-related work, federal regulations require that the employer retain:

- Personal Air Sampling/Exposure Monitoring Records
- Historical Data (used to qualify for exemptions from OSHA's initial monitoring requirements)
- Medical Records (for employees subject to a medical surveillance program)
- Employee Training Records
- Fit Test Records (for employees that use respirators)
- Data to rebut presumption that materials are asbestos-containing.
- If settled dust sampling is used it is advisable to maintain these records also.

Different types of records have different retention requirements. In general, O&M Plan records; inspection, testing, abatement, work permit, waste disposal, contractor, and notification records; and data to rebut presumption that materials are asbestos-containing should all be retained for the life of the O&M Plan and life of the facility. Retention requirements for other records are noted in the sections below.

OSHA requires that employers provide to each employee their record of exposure and medical surveillance under the Records Access Standard (29 CFR 1910.20) and the Hazard Communication Standard (29 CFR 1910.1200 & 1926.59) and the construction asbestos

standard (29 CFR 1926.1101(n)). Also see the OSHA Asbestos Construction Rule (29 CFR 1926.1101), the EPA Worker Protection Rule (40 CFR 763 Subpart G) and the Green Book for details on Record keeping requirements and record retention requirements. Note that state and local regulations may require that additional information be recorded and retained.

EPA recommends that building owners make available all written elements of the O&M program to the building's O&M staff as well as to tenants and building occupants, if applicable. Building owners are also encouraged to consult with their legal counsel concerning appropriate Record keeping strategies as a standard part of their O&M programs.

4.11.1 Objective Data Records

Objective data relied upon as part of an initial or negative exposure assessment must contain the following information:

- The product qualifying for exemption;
- The source of the objective data;
- The testing protocol, results of testing, and/or analysis of the material for the release of asbestos;
- A description of the operation exempted and how the data support the exemption;
- Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.

Objective data records shall be maintained for the duration of the employer's reliance upon such objective data.

4.11.2 Exposure Assessment Records

Exposure assessment records must include the following information:

- The date of measurement;
- The operation involving exposure to asbestos that is being monitored;
- Sampling and analytical methods used and evidence of their accuracy;
- Number, duration, and results of samples taken;
- Type of protective devices worn, if any;
- Name, social security number, and exposure of the employees whose exposures are represented.

Exposure assessment records shall be maintained for at least 30 years.

4.11.3 Medical Surveillance Records

Medical surveillance records must include:

- The name and social security number of the employee;
- A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations;
- Physician's written opinions;
- Any employee medical complaints related to the exposure to asbestos;
- A copy of the information provided to the physician;

Medical surveillance records must be maintained for the duration of employment plus 30 years.

4.11.4 Training Records

Training records must be maintained for one year beyond the last date of employment by that employer.

4.11.5 Inspection, Hazard Assessment and Abatement Records

Asbestos inspections, hazard assessments, abatement records and any other information concerning the identification, location and quantity of ACM shall be maintained by the Facility Asbestos Coordinator for the life of the facility and must be transferred to successive owners of the facility.

4.11.6 Transfer of Records

If the employer ceases to do business and there is no successor employer to receive and retain records for the prescribed period, the employer shall notify the Department of Labor (DOL) at least 90 days prior to disposal and, upon request, transmit the records to the DOL.

4.11.7 Recordkeeping Required by This Program

All documentation required by this program shall be stored in permanent files for the life of the facility and must be transferred to successive owners of the facility. Records shall be maintained for all activities involving asbestos-containing materials (ACM) and shall include: those records listed above, contractor and other personnel notifications, and all other documentation of Plan compliance.

APPENDIX A

FORMS

APPENDIX A - Forms

Employee Notification Letter A-1

Employee Notification Form..... A-2

Contractor, Vendor and Repairman Notification Form A-3

Asbestos Waste Disposal Form..... A-4

Emergency Abatement Form A-5

Building Inspection Form A-6

Example Warning Sign at Regulated Area A-7

EMPLOYEE NOTIFICATION LETTER

Dear _____:

EBI CONSULTING (EBI) was recently retained by the building owner to prepare an Operations and Maintenance (O&M) plan for suspect asbestos-containing materials (ACM) used in the construction and building materials at Villas of Pine Ridge located at 3110 Towne Park Drive in Tyler, Texas (herein the Subject Property). As you may already know, asbestos was used extensively in the construction industry from the mid 1930's until approximately 1989 in many different materials. In fact, surveys conducted by the Environmental Protection Agency (EPA) estimate that asbestos-containing materials can be found in over 750,000 buildings, including schools, public buildings, residential buildings and office buildings in this country.

Note that EBI's scope of work did not include a comprehensive asbestos survey of the Subject Property. There is the possibility for ACM to be present. EBI observed suspect ACM at the Subject Property in the form of textured ceiling materials, textured paint, wallboard/joint compound composite material, vinyl floor tile and associated mastic, sheet vinyl flooring and associated mastic, various construction mastics and caulking, and roofing materials.

Based on the limited assessment conducted at the Subject Property, all suspect ACMs will be considered assumed ACM. This Asbestos O&M Plan has been prepared based on this presumption. All of the materials were observed to be in good condition at the time of inspection. Please note that inaccessible areas and 90% of the units were not visited by EBI during the assessment. Building tenants as well as other non-resident personnel working in the buildings will be informed in writing of the presence and location of ACMs. Building tenants will be informed of the hazards associated with the ACMs.

EBI CONSULTING has prepared an O&M Plan that will enable us to manage the asbestos-containing materials without adversely affecting the operation of our facility and, more importantly, the health and safety of our employees and occupants. This O&M defines specific operating and maintenance procedures to be followed at all times. For the O&M Program, I have been designated as the Facility Asbestos Coordinator. All work shall be coordinated through me. Together, we will ensure that the requirements of the O&M Plan are understood, identify the locations of the asbestos-containing materials and provide the procedures that must be followed so that asbestos fibers are not released into the air.

Please be assured that the implementation of the O&M Plan will play a major role in the continued safe operations in the building(s). If you have any questions concerning this matter, please contact me.

Sincerely,

Facility Asbestos Coordinator

EMPLOYEE NOTIFICATION FORM

DATE:	
LOCATION:	
RE:	<i>Notification of Presence of Asbestos</i>

I have received Asbestos Awareness Training. I have been advised of the presence of suspect ACM (Asbestos-Containing Materials) at Villas of Pine Ridge located at 3110 Towne Park Drive in Tyler, Texas. I am aware that suspect ACM is present at the Subject Property in the form of textured ceiling materials, textured paint, wallboard/joint compound composite material, vinyl floor tile and associated mastic, sheet vinyl flooring and associated mastic, various construction mastics and caulking, and roofing materials. The suspect ACM is in good condition and should not produce airborne fibers unless subjected to damage or improper maintenance action. Additional suspect ACM such as pipe insulation, floor tile, floor tile mastic, and carpet mastic may be present below flooring, behind walls or above ceilings throughout Subject Property. I have been advised that, if it remains intact, there is minimal health risk but, if made friable or disturbed by processes such as, but not limited to, grinding, scraping, or drilling, asbestos-containing materials will produce airborne asbestos fibers.

Building tenants as well as other non-resident personnel working in the buildings will be informed in writing of the presence and location of ACMs. I have been advised of the dangers inherent in handling asbestos and breathing asbestos dust, including, but not limited to, the fact that asbestos can cause asbestosis and is a known carcinogen and can, therefore, cause various types of cancer. I acknowledge and understand that any contact with airborne asbestos fibers whether visible or not, may cause asbestosis and other types of cancer, which may not be detectable for many years.

I have been advised of the following:

- Do not disturb the ACM or suspect/assumed ACM (e.g., do not push furniture against the ACM, do not damage thermal system insulation (TSI)).
- Report any evidence of disturbance or damage of ACM or suspect/assumed ACM to the Facility Asbestos Coordinator.
- Report any dust or debris that might come from the ACM or suspect/assumed ACM, any change in the condition of these materials, or any improper action (relative to ACM or suspect/assumed ACM) of building personnel to the Facility Asbestos Coordinator.
- Cleaning and maintenance personnel are taking special precautions during their work to properly clean up any asbestos debris and to avoid disturbing ACM and suspect/assumed ACM.
- All ACM and suspect/assumed ACM is inspected periodically and additional measures will be taken if needed to protect the health of building occupants.

SIGNATURE:	
SOCIAL SECURITY NO.:	(Last Four Digits):
WITNESS:	

CONTRACTOR, VENDOR AND REPAIRMAN NOTIFICATION FORM

DATE:	
LOCATION:	
RE:	<i>Notification of Presence of Asbestos</i>

I have received Asbestos Awareness Training. I have been advised of the presence of suspect ACM (Asbestos-Containing Materials) at Villas of Pine Ridge located at 3110 Towne Park Drive in Tyler, Texas. I am aware that suspect ACM is present at the Subject Property in the form of textured ceiling materials, textured paint, wallboard/joint compound composite material, vinyl floor tile and associated mastic, sheet vinyl flooring and associated mastic, various construction mastics and caulking, and roofing materials. The suspect ACM is in good condition and should not produce airborne fibers unless subjected to damage or improper maintenance action. I have been advised that, if it remains intact, there is minimal health risk but, if made friable or disturbed by processes such as, but not limited to, grinding, scraping, or drilling, asbestos-containing materials will produce airborne asbestos fibers.

Building tenants as well as other non-resident personnel working in the buildings will be informed in writing of the presence and location of ACMs. I have been advised of the dangers inherent in handling asbestos and breathing asbestos dust, including, but not limited to, the fact that asbestos can cause asbestosis and is a known carcinogen and can, therefore, cause various types of cancer. I understand that, at a minimum, completion of a formal asbestos awareness training program is required prior to my participation in any asbestos disturbance, abatement or removal activities.

I acknowledge and understand that any contact with airborne asbestos fibers whether visible or not, may cause asbestosis and other types of cancer, which may not be detectable for many years.

I have been advised of the following:

- Do not disturb the ACM or suspect/assumed ACM (e.g., do not push furniture against the ACM, do not damage thermal system insulation (TSI)).
- Report any evidence of disturbance or damage of ACM or suspect/assumed ACM to the Facility Asbestos Coordinator.
- Report any dust or debris that might come from the ACM or suspect/assumed ACM, any change in the condition of these materials, or any improper action (relative to ACM or suspect/assumed ACM) of building personnel to the Facility Asbestos Coordinator.
- Cleaning and maintenance personnel are taking special precautions during their work to properly clean up any asbestos debris and to avoid disturbing ACM and suspect/assumed ACM.
- All ACM and suspect/assumed ACM is inspected periodically and additional measures will be taken if needed to protect the health of building occupants.

SIGNATURE:	
SOCIAL SECURITY NO.:	(Last Four Digits):
WITNESS:	

ASBESTOS WASTE DISPOSAL FORM

NAME OF BUILDING:

DATE:

OWNER OR OPERATOR OF LANDFILL:

NAME:

ADDRESS:

CITY, STATE, ZIP:

PHONE:

NAME OF LANDFILL:

NAME:

ADDRESS:

CITY, STATE, ZIP:

PHONE:

LICENSED HAZARDOUS
WASTE TRANSPORTER:

APPROXIMATE VOLUME OF
ASBESTOS RECEIVED:

TYPE OF CONTAINER
ASBESTOS IS IN:

ASBESTOS CONTAINERS
LABELED?

YES

NO

LANDFILL OWNER/OPERATOR SIGNATURE:

DATE:

EMERGENCY ABATEMENT FORM

DATE:

BUILDING:

LOCATION:

CAUSE OF EMERGENCY ABATEMENT

OPERATION AND MAINTENANCE PROCEDURES FOLLOWED:

DESCRIPTION OF ACTIONS TAKEN:

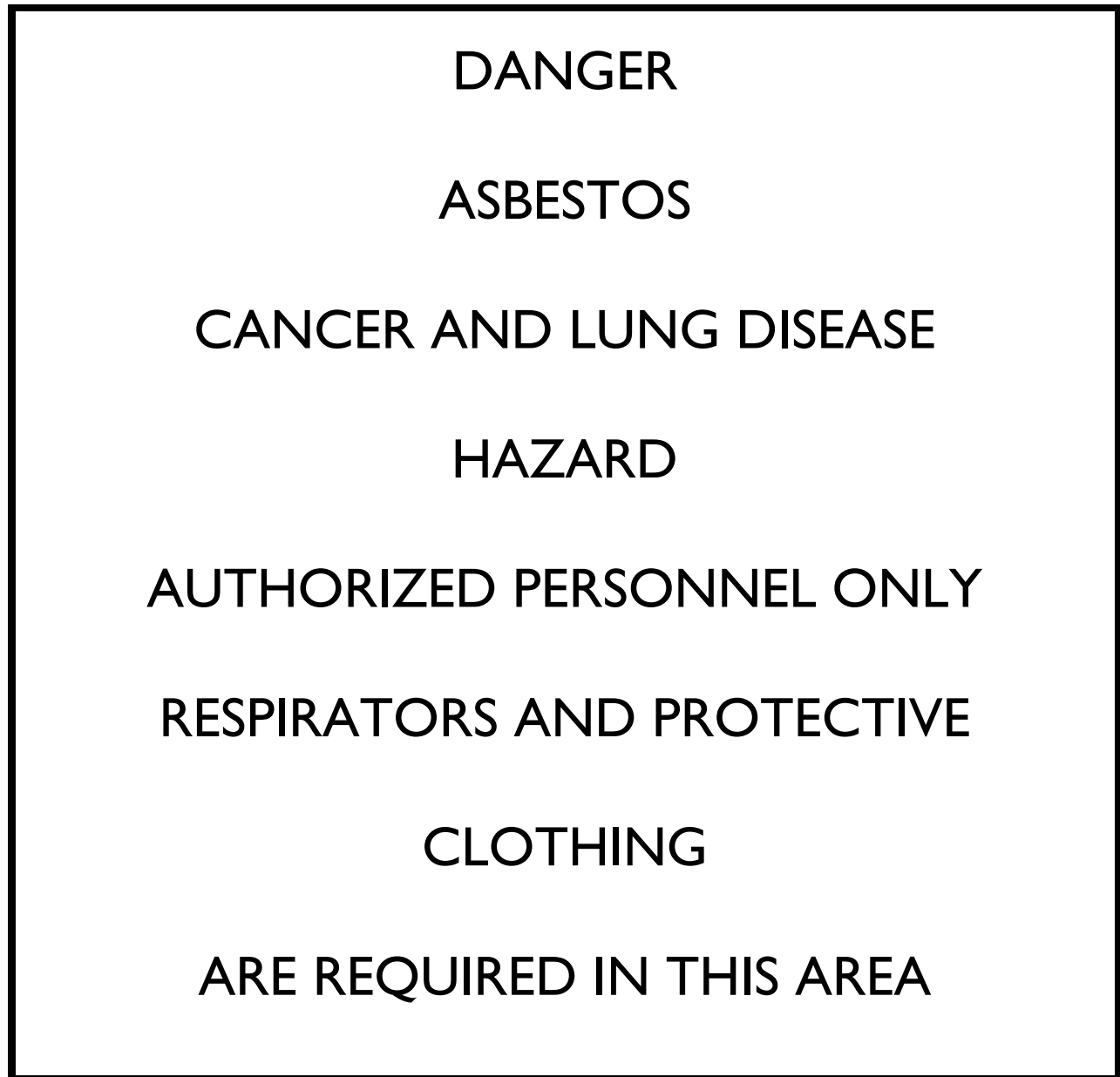
SIGNATURE:

TITLE:

BUILDING INSPECTION FORM

DATE:	BUILDING:	FLOOR:	
INSPECTION LOCATIONS:			
REASON FOR INSPECTION:	DAMAGED MATERIAL:		PERIODIC SURVEY:
IF DAMAGED MATERIAL IS REASON FOR INSPECTION, PLEASE COMPLETE 1 THROUGH 5			
1. TYPE OF MATERIAL DAMAGED:			
2. CAUSE OF DAMAGE:			
3. APPROXIMATE SIZE OF DAMAGED AREA:			
4. IS THERE MATERIAL DEBRIS ON FLOOR OR OTHER LOCATIONS?			
5. ARE EMPLOYEES/TENANTS/SUBCONTRACTORS IN IMMEDIATE AREA?			
6. HAS MATERIAL CONDITION CHANGED SINCE LAST INSPECTION?			
IF CHANGE HAS OCCURRED, PLEASE DESCRIBE THE CHANGE.			
COMMENTS:			
NEXT SCHEDULED INSPECTION DATE:			
INSPECTOR'S SIGNATURE(S):			

EXAMPLE WARNING SIGN AT REGULATED AREA



Required by 29 CFR 1926.1101 Paragraph (k)(7)(ii)"...at each regulated area. In addition, warning signs shall be posted at all approaches to regulated areas..."

APPENDIX B

TRAINING PROGRAMS

LEVEL I (OSHA Class IV)

AWARENESS TRAINING FOR CUSTODIAL AND MAINTENANCE PERSONNEL

Purpose: To provide participants with a basic understanding of the characteristics of asbestos, why and where it is used, health-related concerns, and how to avoid inadvertent exposure.

Learning Objectives: After completing this session participants should be able to:

- 1) Provide a general definition of asbestos.
- 2) Define friability.
- 3) Describe the unique properties of asbestos.
- 4) Describe the common uses of asbestos.
- 5) Describe the health effects associated with asbestos exposure.
- 6) Know the primary uses and locations of asbestos in the buildings where they work.
- 7) Recognize a potential health hazard (damage, deterioration or delamination of asbestos).
- 8) Understand the general in-house procedures for handling asbestos materials.
- 9) Know the name and telephone number of the Facility Asbestos Coordinator.

Topic Outline

- 1) Characterization of Asbestos and Its Uses
 - a) Definition of asbestos, examples of various types in naturally occurring rock form
 - b) Description of unique properties
 - c) EPA definition of friability, examples of friable and non-friable materials
 - d) Common uses of asbestos (fireproofing, pipe lagging, brake linings, gaskets, etc.)
- 2) Health-Related Concerns
 - a) Diseases associated with asbestos exposure
 - b) Dose-response relationship
 - c) Latency period
 - d) Routes of entry into the body
 - e) Defense mechanisms of the body
- 3) Recognition of Potential Hazards
 - a) Damage
 - b) Deterioration
 - c) Other
- 4) Site-Specific Information
 - a) Primary locations and uses of asbestos at the Subject Property
 - b) How to avoid inadvertent exposures
- 5) Overview of the Subject Property's Operations and Maintenance Plan and Asbestos Control Program
 - a) Description of asbestos-related work procedures
 - b) Plans for future
 - c) Where to go for more information
- 6) Questions and answers

**TRAINING PROGRAM FOR
OPERATIONS AND MAINTENANCE STAFF**

EXAMPLE AGENDA

DAY I

LEVEL I (Awareness Training)

8:30-8:45	Characterization of Asbestos and Its Uses.....	15 Minutes
8:45-9:15	Health Effects of Asbestos Exposures	30 Minutes
9:15-9:45	Location & Condition of Asbestos-Containing Materials/ Recognition of Damage, Deterioration and Delamination	30 Minutes
9:45 - 10:00	How to Avoid Disturbance.....	15 Minutes
10:00-10:15	Break.....	15 Minutes
10:15-10:30	Overview of Facility's Operations & Maintenance Plan/ Asbestos Control Plan.....	15 Minutes
10:30-10:45	Questions and Answers.....	5 Minutes

LEVEL II (OSHA Class III)

CUSTODIAL AND MAINTENANCE PROCEDURES FOR HANDLING ASBESTOS-CONTAINING MATERIALS (SMALL SCALE, SHORT DURATION PROJECTS)

Purpose: To provide participants with necessary information to properly protect themselves from exposure to asbestos and to minimize asbestos contamination of the building during performance of maintenance and custodial activities.

Learning Objectives: After completing this session participants should be able to:

- 1) Understand the primary aspects of regulations that protect them and the public from exposure to asbestos.
- 2) Understand the meaning and importance of a medical surveillance program.
- 3) Understand the proper use, maintenance and limitations of respirators and protective clothing (see Section 4.8.2).
- 4) Know how to perform cleaning using wet wiping techniques and HEPA filter vacuuming.
- 5) Know proper work practices and equipment for conducting small scale short duration projects including use of mini-enclosures.
- 6) Understand proper decontamination techniques.
- 7) Know how to respond to a fiber release episode.
- 8) Know how to properly dispose of asbestos-containing materials and associated wastes.
- 9) Understand how the work permit system operates to avoid inadvertent disturbances of asbestos-containing materials.

Topic Outline

- 1) Regulations
 - a) Occupational Safety and Health Administration (OSHA) Standard
 - b) Environmental Protection Agency (EPA) Regulations
 - c) Texas Asbestos Health Protection Rules
- 2) Medical Surveillance Program
 - a) Importance
 - b) Who needs an examination
 - c) What is needed on an examination
 - d) Reasons for specific procedures
 - e) When is an examination needed
 - f) Where are records kept for review
- 3) Respirators and Protective Clothing
 - a) Why they are needed
 - b) Types of respirators
 - c) Method of protection
 - d) Respirator program
 - e) Protective clothing
 - f) Fit testing
 - g) Respirator maintenance

LEVEL II TRAINING (continued)

- 4) Proper Cleaning Techniques
 - a) Understanding potential for resuspension of fibers into the air
 - b) Wet wiping techniques
 - c) Use and maintenance of a HEPA filter vacuum
 - d) Identifying proper techniques for type of material (fabric, hard surfaces, etc.)
 - e) Appropriate personal protection
- 5) Work Practices for Routine Maintenance Activities
 - a) Routine maintenance involving surfacing materials
 - b) Maintenance activities in confined or restricted spaces
 - c) Maintenance work related to renovation
 - d) Routine maintenance involving miscellaneous asbestos-containing materials (floor tiles, etc.)
- 6) Procedures for Fiber Release Episodes
 - a) Equipment contained in an emergency response kit
 - b) Location of emergency response kit
 - c) Appropriate personal protection
 - d) Procedures for clean-up of asbestos-containing materials
 - e) Repair of in-place asbestos-containing materials
- 7) Proper Disposal Procedures
 - a) Wetting techniques
 - b) Use of 6-mil impermeable bags
 - c) Use of rigid containers for transport
 - d) Proper labeling
 - e) Use of approved landfill
- 8) Work Management System
 - a) Purpose of a work permit system
 - b) Proper procedure to follow before beginning maintenance activity

APPENDIX C
WORK PERMIT SYSTEM FORMS

APPENDIX C - Work Permit System Forms

Work Permit Form for Maintenance Work	C-1
Evaluation of Work Affecting Asbestos-Containing Materials.....	C-2
Work Permit Log.....	C-3

WORK PERMIT FORM FOR MAINTENANCE WORK

NAME:

DATE:

TELEPHONE NUMBER:

1. Address, building, and room number(s) (or description of area) where work is to be performed:

2. Requested starting date:
Anticipated finish date:

3. Description of work:

4. Description of any asbestos-containing materials that might be affected, if known (include location and type):

5. Name and telephone number of requester:

6. Name and telephone number of supervisor:

Submit this application to: (the Facility Asbestos Coordinator)

NOTE: An application must be submitted for all maintenance work regardless of whether asbestos-containing materials might be affected. An authorization must then be received before any work can proceed.

REQUESTER SIGNATURE:

DATE:

SUPERVISOR'S SIGNATURE:

DATE

GRANTED: (JOB REQUEST NO. _____)

DENIED:

FACILITY ASBESTOS COORDINATOR
SIGNATURE:

DATE

Evaluation of Work Affecting Asbestos-Containing Materials

This evaluation covers the following maintenance work:

Location of work (address, building, room number(s), or general description): _____

Date(s) of work: _____

Description of work: _____

Work approval form number: _____

Evaluation of work practices employed to minimize disturbance of asbestos: _____

Evaluation of work practices employed to contain released fibers and to clean up the work area: _____

Evaluation of equipment and procedures used to protect workers: _____

Personal air monitoring results: (in-house worker or contract?)

Worker name _____ Results: _____

Worker name _____ Results: _____

Handling or storage of ACM waste: _____

Signed: _____ Date: _____

(Facility Asbestos Coordinator)

WORK PERMIT LOG

WORK PERMIT NO.	REQUESTED BY	ROOM	START DATE	COMPLETION DATE	APPROVED

APPENDIX D
WORK PRACTICES

Work Practice Levels

Three work practice levels are judged to sufficient to encompass a broad range of situations which are likely to be encountered. The levels are simply a means of structuring the guidance which the Program provides. Up to three levels are included for each work practice to address different degrees of potential asbestos fiber release. A different number of levels might be selected by a Facility Asbestos Coordinator or designed into a specific asbestos O&M program.

A change of level does not imply a different task to be accomplished. It implies a changed potential for asbestos fiber release, typically related to either the condition of asbestos, nature of the work practice, skill of the workers or the building context in which the task will be performed.

The levels for each work practice included in this Program are defined principally in relation to the OSHA asbestos standards. There are three standards that may apply. The OSHA construction standard, 29 CFR 1926.1101, applies to most O&M activities, including cleaning that is associated with construction. Normal cleaning, that is not associated with construction or other O&M work, including cleaning and buffing of resilient flooring, is covered by the OSHA general industry standard, 29 CFR 1910.1001.

The OSHA construction standard sets forth four classes of construction-related work. Operations and maintenance and cleaning activities connected with construction work are defined as Class III and IV work. The principal difference for O&M activities is that Class III work disturbs the ACM and Class IV only contacts, but does not disturb the ACM. This Program also contains some work practices that can involve housekeeping operations which are subject to either the OSHA construction or the general industry standard.

Activities that are not intended to contact ACM and are not likely to disturb ACM are not given a level designation, but require control to insure that a disturbance does not occur. Areas where ACM is located and where access can be controlled should be designated as "Controlled Areas." ACM systems in the vicinity of work but which do not need to be contacted should be designated as "Controlled Systems." Exposure monitoring is not required for these activities as ACM is not being contacted. Awareness training is needed to inform workers about the location of the ACM, and to advise them to avoid contacting it, and to report any damaged ACM they observe.

In general, an O&M program is easier to implement and is more cost effective if maintenance work can be performed without the need for enclosures. Maintenance work that contacts or disturbs ACM is governed by OSHA. To be able to perform maintenance work governed by the Construction Standard (1926.1101) without an enclosure and still comply with OSHA, it is necessary to make a negative exposure assessment (NEA). This effectively makes the OSHA PEL a limit on the level of airborne asbestos that can be generated by a work practice before enclosure is required. In general, Level A and B maintenance activities related to construction are un-enclosed and as such require a negative exposure assessment. Level C work practices are enclosed and as such may generate airborne fiber levels above the OSHA PEL. Note that a negative exposure assessment alone does not eliminate the requirement for respiratory protection. Respiratory protection is required, even with an NEA, if ACM is removed in a non-intact state, if wet methods are not used, or for removal of TSI or surfacing material. Intact is defined by OSHA as ACM that has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer bound with its matrix.

Cleaning work not related to construction or dust and debris generated by such activity is governed by the OSHA General Industry Standard (1910.1001). This standard does not contain provisions for a negative exposure assessment. Routine cleaning activities are performed as Level A based on a determination having been made that cleaning activities using the work practices in this Program (which are based on those contained in the OSHA regulation) are not reasonably expected to result in exposures exceeding the PEL.

The three work practice levels are defined as follows:

- **Level A:** Level A is work that may contact ACM, but which will not disturb it. Level A is defined in terms of Class IV work in the construction standard (29 CFR 1926.1101). It is Class IV work (except for cleanup work) with a negative exposure assessment which involves maintenance and custodial activities during which employees contact ACM, but do not disturb it. Note that clean up of asbestos-containing debris and waste is not Level A work (Refer to Level B for this type of clean up work). It is also Class II work (involving non-friable materials such as gaskets, roofing, and cement asbestos board) with a negative exposure assessment.

Work practices required for Level A are those set forth in paragraph (g) (10) of the OSHA asbestos construction standard for Class IV work and (g)(8) and (g)(11) for Class II work. See Figure 1 for checklist of requirements

- **Level B:** Level B is work that may disturb ACM, but where the OSHA PEL is not exceeded and release of ACM, dust and debris is confined to the immediate location of the disturbance. In the construction standard, it is Class III work on TSI or Surfacing ACM with a negative exposure assessment, Class IV work activities to cleanup waste and debris containing ACM with an NEA. Class III asbestos work includes repair and maintenance operations, where ACM, including thermal system insulation and surfacing material, is likely to be disturbed. Operations where TSI or surfacing are worked on using “aggressive” methods, such as drilling, cutting, abrading, etc. are Level C work, as OSHA requires area isolation for these procedures whether or not a negative exposure assessment is made. In the general industry standard, clean up of ACM waste, debris and accompanying dust that are not from construction activities, and where the PEL is not exceeded is Level B work. If the quantity of material disturbed during Class III work exceeds one 60 inch x 60 inch glovebag or waste bag, then the activity becomes Class I or II and exceeds the limitation of the work practices in this manual.

Work practices required for Level B are those set forth in paragraph (g) (9) of the OSHA construction standard for Class III work and (g)(7, 8 and 11) for Class II work. These include O&M training, respirators, engineering controls and work practices, wet methods, local exhaust ventilation (Note: A respirator is not required if work is on non-TSI or non-surfacing material, there is a negative exposure assessment, wet methods are used, and the material remains intact.). In the construction standard, asbestos-containing debris and waste from construction activities (including O&M) are to be promptly cleaned up and disposed of in leak-tight containers. The general industry standard covers clean up of non-construction waste, debris and accompanying dust. These must be cleaned up with wet methods and HEPA vacuums. The construction standard requires that in areas with accessible, friable TSI and surfacing material, waste or debris must be presumed to contain asbestos. See Figure 2 for checklist of requirements.

- **Level C:** Level C is work where ACM is disturbed and the PEL may be exceeded or ACM, dust, and/or debris may be scattered beyond the immediate location of the disturbance. It is Class III work described in the OSHA construction standard: paragraph (g)(9)(iii) where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material; or (g)(9)(iv) where there is no negative exposure assessment or where the PEL is exceeded. It is also Class II work without an NEA.

Work practices required for Level C are mini-enclosures, glovebags and other enclosure devices set forth in paragraph (g)(5) of the construction standard as well as work practices set forth in paragraph (g)(9) of the OSHA construction standard for Class III work. These include O&M training, respirators, engineering controls and work practices, wet methods, and local exhaust ventilation. Debris and waste are to be promptly cleaned up and disposed of in leak-tight containers. See Figure 3 for checklist of requirements.

A "disturbance" of ACM, as used in the level definitions, refers to any activity that disrupts the matrix of ACM, crumbles or pulverizes ACM, or generates visible debris or dust from ACM.

Figures 1 through 3 which follow, summarize the engineering controls and practices recommended for each level. The Facility Asbestos Coordinator should determine the appropriate level, based on the O&M program objectives, the O&M program elements, and level of training needed for each level of work practices used in a facility.

Figure 1: Level A Worker Checklist for Operations and Maintenance Work Practices

Level A work may contact ACM but not disturb it. If you encounter damaged ACM, or if the work could damage the ACM, stop work and notify your supervisor.

Level B is work that may disturb ACM, but where the OSHA PEL is not exceeded and release of ACM, dust and debris is confined to the immediate location of the disturbance.

Level C is work where ACM is disturbed and the PEL may be exceeded or ACM, dust, and/or debris may be scattered beyond the immediate location of the disturbance. Level C work must take place in an enclosure (glovebag or mini-enclosure).

Pre-Work Activities

- ___ Obtain and review copies from Supervisor or Facility Asbestos Coordinator of:
 - ___ Completed Work Permit Form
 - ___ Work practice(s) to be used including personal protective equipment options
 - ___ Work Notification(s) (as applicable)
 - ___ Schedule for work
- ___ Review work practices and **General Procedure W1** and any other general procedures used in work practice.
- ___ Inspect work area for visible dust or debris. If present, stop work and notify Facility Asbestos Coordinator.
- ___ Obtain recommended tools, equipment and materials as described in **General Procedure W1, work practice(s) item 2**, and Work Permit Form.
 - ___ Move tools, equipment and materials to work area.
- ___ Shut off and lock out any HVAC or electrical systems to be worked on.
- ___ If required on Work Permit Form, put on respirators and perform fit checks - **See General Procedure W6**.

Work Practices

Always use wet methods, HEPA vacuums, prompt clean-up and disposal of waste. Do not dry clean-up dust and debris, or use compressed air or high-speed abrasive saws.

- ___ Perform work per steps in work practice(s).

Clean-Up and Tear Down

- ___ Remove lockout tags (if used) & restart any HVAC/electrical system(s) that were shut off.
- ___ Return tools, equipment and remaining materials to storage area.
- ___ Notify Facility Asbestos Coordinator or supervisor that work is completed & return documents to Facility Asbestos Coordinator.

Figure 2: Level B Worker Checklist for Operations and Maintenance Work Practices

Pre-Work Activities

- ___ Obtain and review copies from Supervisor or Facility Asbestos Coordinator of:
 - ___ Completed Work Permit Form
 - ___ Work practice(s) to be used including personal protective equipment options
 - ___ Work Notification(s) (as applicable)
 - ___ Schedule for work
- ___ Review work practices and referenced general procedures used in work practice(s).
- ___ Obtain recommended tools, equipment and materials - **See General Procedure W1 and work practice(s) item 2.**
- ___ Obtain required respirators as listed on Work Permit Form.
- ___ Move tools, equipment and materials to work area.
- ___ Shut off and lock out HVAC and electrical systems serving work area - **See General Procedure W3.**
- ___ Vacate and secure work area, such as by locking doors and/or setting up temporary barriers - **See General Procedure W4.**
- ___ Put on respirators and perform fit checks - **See General Procedure W6.**
- ___ Put on protective clothing - **See General Procedure W7.**
- ___ Air monitoring personnel begins air monitoring work (if required) - **See General Procedure W8.**
- ___ Preclean work area if visible dust or debris is present - **See General Procedure W9.**

Work Area

- ___ Set up work area as required by work practice - **See General Procedure W10.**

Work Practices

- ___ Perform work per steps in work practice(s).

Clean-Up and Tear Down

- ___ Package and label asbestos waste for disposal - **See General Procedure W11.**
- ___ Apply lockdown encapsulant, where required, using garden sprayer, to surfaces where ACM was removed or disturbed - **See General Procedure W12.**
- ___ Perform ceiling panel replacement work or ceiling repair work if needed.
- ___ Clean tools, equipment and work area using wet wiping and HEPA vacuuming as appropriate and return tools and equipment to outside work area - **See General Procedure W13.**
- ___ Decontaminate packaged waste & move waste to outside work area - **See General Procedure W14.**
- ___ Workers decontaminate and remove protective clothing and respirators. If contaminated, dispose of protective clothing as ACM - **See General Procedure W15.**
- ___ Complete visual inspection. Complete air monitoring work - **See General Procedure W16.**
- ___ If feasible, get Facility Asbestos Coordinator or designee to complete Evaluation of Work Form.
- ___ Transport waste to designated asbestos waste storage area - **See General Procedure W17.**
- ___ Remove drop cloth, clean with HEPA/wet methods or properly dispose of as contaminated.
- ___ Return decontaminated tools, equipment and remaining materials to storage area.
- ___ Remove lockout tags and restart HVAC/electrical system(s).
- ___ Restore normal accessibility to work area.
- ___ Notify Facility Asbestos Coordinator or Supervisor that work is completed & return documents to Facility Asbestos Coordinator.

Figure 3: Level C Worker Checklist for Operations and Maintenance Work Practices

Pre-Work Activities

- ___ Obtain and review copies from Supervisor or Facility Asbestos Coordinator of:
 - ___ Completed Work Permit Form
 - ___ Work practice(s) to be used including personal protective equipment options
 - ___ Work Notification(s) (as applicable)
 - ___ Schedule for work
- ___ Review work practices and referenced general procedures used in work practice(s).
- ___ Obtain recommended tools, equipment and materials - **See General Procedure W1 and work practice(s) item 2.**
- ___ Obtain required respirators as listed on Work Permit Form.
- ___ Move tools, equipment and materials to work area.
- ___ Shut off and lock out HVAC and electrical systems serving work area - **See General Procedure W3.**
- ___ Vacate and secure work area, such as by locking doors and/or setting up temporary barriers - **See General Procedure W4.**
- ___ Put on respirators and perform fit checks - See General Procedure W6.
- ___ Put on protective clothing - **See General Procedure W7.**
- ___ Air monitoring personnel begins air monitoring work (if required) - **See General Procedure W8.**
- ___ Preclean work area if visible dust or debris is present - **See General Procedure W9.**

Work Area

- ___ Perform all Level C work inside an enclosure (glovebag or mini-enclosure) Set up work area and decontamination facilities as required by work practices - **See General Procedures W5, W10, W18, and W20.**

Work Practices

- ___ Perform work per steps in work practice(s).

Clean-Up and Tear Down

- ___ Package and label asbestos waste for disposal - **See General Procedure W11.**
- ___ Apply lockdown encapsulant, where required, using garden sprayer, to surfaces where ACM was removed or disturbed - **See General Procedure W12.**
- ___ Perform ceiling panel replacement work or ceiling repair work if needed.
- ___ Clean tools, equipment and work area using wet wiping and HEPA vacuuming as appropriate and return tools and equipment to outside work area - **See General Procedure W13.**
- ___ Decontaminate packaged waste & move waste to outside work area - **See General Procedure W14.**
- ___ Workers decontaminate and remove protective clothing and respirators. If contaminated, dispose of protective clothing as ACM - **See General Procedure W15.**
- ___ Complete visual inspection. Complete air monitoring work - **See General Procedure W16.**
- ___ If feasible, get Facility Asbestos Coordinator or designee to complete Evaluation of Work Form.
- ___ Transport waste to designated asbestos waste storage area - **See General Procedure W17.**
- ___ Remove drop cloth and/or mini-enclosure, clean with HEPA/wet methods or properly dispose of as contaminated.
- ___ Return decontaminated tools, equipment and remaining materials to storage area.
- ___ Remove lockout tags and restart HVAC/electrical system(s).
- ___ Restore normal accessibility to work area.
- ___ Notify Facility Asbestos Coordinator or Supervisor that work is completed & return documents to Facility Asbestos Coordinator.

W-I Tools, Equipment and Materials

The following is a list of tools, equipment and materials that are referenced in the work practices and are recommended to perform the work practices. Tools, equipment or materials that are unique to a certain work practice are listed under item 2 in each work practice. For frequent O&M work, it might be helpful to maintain an "O&M cart" containing the necessary tools, equipment and materials.

Tools and Equipment

- * Utility knife
- * Ground fault circuit interrupters (GFCIs), Extension cords and adapters - GFCIs should be used on any electrical equipment or tools used in O&M work where water might be in use or present in the work area.
- * Lockout tags
- * Temporary work lights
- * Ladder or scaffold for elevated work
- * Wet wipes or bucket with clean water for wet wiping
- * Smoke test bulb and tubes
- * Bone saw
- * Wire cutters
- * Tin snips
- * Safety glasses

Abatement Equipment and Materials

- * Polyethylene sheet
- * Duct tape
- * Disposal bags with labels
- * High efficiency particulate air (HEPA) vacuum with hose, attachments and proper HEPA filter (wet/dry type needed for some work practices)
- * Respirators (if required)
- * Disposable coveralls (if required)
- * Disposable towels or wet wipes
- * Asbestos barrier tape
- * Warning signs
- * Garden sprayer with amended water or removal encapsulant (Level B and C practices) See general procedure W2.
- * Aerosol cans or garden sprayer with lockdown encapsulant (Level B and C practices)
- * Air monitoring pumps, cassettes and calibration equipment (if required)
- * Frame for mini-enclosure or prefabricated mini-enclosure (Level C practices)
- * Negative pressure machine (HEPA filtered exhaust fan) as required for size of enclosure (level C practices - could be negative pressure machine or additional HEPA vacuum)
- * Manometer (if pressure differential measurements are desired)
- * Glovebags (if required)

W-2 Preparing Amended Water or Removal Encapsulant

Amended water or removal encapsulant solutions are prepared by mixing a measured amount of surfactant or encapsulant with clean water in accordance with the manufacturer's instructions. Surfactants and encapsulants materials might be considered hazardous substances. Containers of amended water or removal encapsulant should be labeled to identify the contents in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200). Review and comply with Material Safety Data Sheet (MSDS) before mixing and using these materials. Amended water or removal encapsulant should be mixed in a labeled garden sprayer unit prior to the start of an O&M activity. Liquid dishwashing detergent might be used as a surfactant for O&M work. They have used a mix of 8 parts water to one part detergent.

W-3 Shut-off and Lockout of HVAC and Electrical Systems

Any electrical systems that might be worked on or affected by O&M activities should be shut off, locked and tagged with electrical lockout tags at the circuit breaker panel or disconnect switch. Affected systems include systems that could create electrical hazards during O&M activities that involve wetting.

HVAC systems in a work area, systems that serve a work area, or systems that will be worked on should be shut down during O&M activities. Level A activities usually do not require HVAC shut down unless a work will occur on a system or a disturbance of asbestos will occur. Any air-handling systems (supply, return and exhaust) required to be shut down should be shut off, locked, and tagged with electrical lockout tags at the circuit breaker panel or disconnect switch.

Lockout tags should note when and why power is shut down and the personnel performing the lockout. There should only be one key for each lock used on lockout tags to prevent accidental reactivation of equipment.

W-4 Securing Work Area

When asbestos fibers might be released, work areas should be vacated and secured (where feasible) by scheduling, locking doors (from inside the area if possible) or other means. If this is not feasible, access to the work area should be restricted, such as by asbestos barrier tape around the perimeter of the work area. If barrier tape is used to denote a work area, it should be placed 5 to 10 feet (1.5 to 3 meters) outside of any polyethylene protection used in the work area. Install barrier tape by taping or tying it to fixed objects.

Do not block access to any emergency exits, and when asbestos fibers might be released, post OSHA required "danger" signs at all entrances to the work area. For such projects, it might be desirable to have a visual barrier installed several feet in front of warning signs to avoid having warning signs readily visible to occupants. A "keep out of construction area" sign should be posted on visual barriers. A visual barrier would be arranged so that a person who goes past the visual barrier will then see required warning signs.

W-5 Critical Barriers

Completely Separate the Work Area from other portions of the building, and the outside by closing all openings with sheet plastic barriers at least 6 mil (0.15 mm) in thickness, or by sealing cracks leading out of Work Area with duct tape.

Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the Work Area with duct tape alone or with polyethylene sheeting at least 6 mil (0.15 mm) in thickness, taped securely in place with duct tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing of lighting fixtures to avoid melting or burning of sheeting.

Provide Sheet Plastic barriers at least 6 mil (0.15 mm) in thickness as required to seal openings completely from the Work Area into adjacent areas. Seal the perimeter of all sheet plastic barriers with duct tape or spray cement.

W-6 Putting on Respirators and Performing Fit Checks

The procedures described below are based on the assumption that workers wearing respirators have been trained in the use of respirators and, for negative pressure respirators, fit tested, and enrolled in a medical surveillance program as part of a Respiratory Protection Program. Respirators used should be approved by NIOSH and/or MSHA. These procedures are not a substitute for a Respiratory Protection Program in accordance with OSHA standard 29 CFR 1910.134 or regulatory requirements regarding respirators.

Putting on Respirators

Wearers should inspect their respirators before each use of the respirator.

Respirators must not be damaged, have missing parts or be deformed in any way. The straps must be intact and well attached. Proper filter cartridges for the hazards to be encountered must be installed. Verify that filters have been replaced in accordance with the Respiratory Protection Program. Batteries for powered respirators should be fully charged. The respirator should also be cleaned if it was not cleaned after the last use. If any problems exist, the respirator should be repaired or replaced in accordance with the Respiratory Protection Program.

When putting on a respirator, the straps should be loosened before it is put on. Filter caps (such as those used on some Powered Air Purifying Respirators) should be taped to the filter body or stored where it will not be lost. Powered respirators should be turned on and flow checked before the facepiece is put on. The respirator should be put on and then the straps tightened as recommended in the manufacturer's information provided with the respirator. Fit checks should then be performed.

Fit Checks

Fit checks should be performed in accordance with the Respiratory Protection Program by each worker each time they put on a respirator. Both positive and negative pressure fit checks should be performed. When feasible, powered respirators should be checked with the motor unit turned off. A negative pressure fit check is done by donning the respirator and pulling the respirator straps so the unit fits snugly. Inhale gently while placing hands over filters to block off inhalation side. Respirator should pull to face and no air should leak in around face seal.

A positive pressure fit check is done by exhaling gently (without breaking respirator seal to face) breathing normally while blocking off the exhalation valve. The face piece should then expand away from face while exhaling.

Adjust respirator straps as needed to obtain a good seal of the facepiece to the face. If a good seal cannot be obtained, obtain a new respirator and perform fit tests again.

W-7 Putting on Protective Clothing

Protective clothing for workers typically consists of disposable coveralls, gloves and boots. Coveralls should have hoods and booties attached. They should provide complete coverage of the body with the exception of hands and face. Cloth coveralls that are cleaned by a facility equipped to launder asbestos contaminated clothing might also be used. Do not modify coveralls.

Protective clothing options available for O&M work include the following:

- * **Level A & B:** If level A or B work is to be performed and the potential for exposure to asbestos-containing dust and debris is low and localized, use one disposable coverall with no street clothes, or one disposable coverall over street clothes.
- * **Level C:** Level C work is to be performed inside of a mini-enclosure and if potential for exposure to asbestos-containing dust and debris is moderate or dispersed, use two disposable coveralls with no street clothes; or if street clothes are required, two coveralls should be worn over the street clothes. Preferably the street clothes should be removed before the start of work.

When possible, street clothes should be removed in a changing area before protective clothing is put on. Protective clothing should be put on after respirators. The coverall hood should cover respirator straps.

Workers are encouraged to wear protective gloves that are duct taped at the cuffs to the protective coveralls. Eye, hearing, and head protection should also be used where needed. Rubber slip-resistant boots or other non-slip footwear is to be worn for all activities. (protective booties should cover feet inside the boots). Steel-toed boots should be used in areas where foot hazards exist. Do not use coveralls with loose foot coverings for activities that involve climbing ladders or working on scaffold.

W-8 Beginning & Conducting Air Monitoring During Work Practices

Note: *This section is not intended as a substitute for a complete Air Monitoring Program and specific protocols needed for O&M work. This section notes air monitoring issues that need to be addressed by the air monitoring person.*

Air monitoring during O&M activities can consist of personal monitoring, area monitoring and clearance monitoring. Air monitoring required for the work practice being performed should be listed on the Work Permit Form and be conducted in accordance with applicable regulations (such as 29 CFR 1926.1101 Appendix A), the O&M Plan and Air Monitoring Program. All air monitoring work should be conducted by a trained person assigned by the Facility Asbestos Coordinator.

The air monitor person should calibrate, adjust, and record the flow rate of all air monitoring pumps to be used before air monitoring is started for an O&M activity. General procedure W16 covers visual inspections and the completion of air monitoring at the end of the work.

Personal Monitoring

To perform personal monitoring, attach a personal air monitoring pump to a belt worn by the worker. Attach an air sampling cassette to the hose from the pump. Route the hose up the worker's back and tape the hose to the worker's protective coveralls using duct tape. The cassette should be located with the open end facing downwards at approximately a forty-five degree angle in the worker's "breathing zone" at about collar level. Turn the pump on and record start time. The air monitoring person will retrieve or change the cassette when necessary, or when work is completed.

Area Monitoring

Area monitoring is usually performed using high volume air sampling pumps. Place pumps inside the work area and outside the work area in occupied areas or areas where occupants could be exposed if fibers are released from the work area. Pumps should be located where they obtain meaningful measurements of potential worker exposure during monitoring as well as measure any area contamination. Attach sampling cassettes to the hoses from the pumps and attach the cassettes to the top of tripod stands or other stable structures (do not use the pump as a stand due to its vibrations) to locate the sample at four to five feet (1.2 to 1.5 meters) above the floor. These cassettes should be located with the open end facing downwards at approximately a forty-five degree angle. The air monitoring person will retrieve or change cassettes as needed or when the work is completed.

If any samples analyzed during the work exceed predetermined "stop work levels" specified in the O&M program, productive work shall be stopped, the area cleaned and additional engineering controls implemented, as necessary.

W-9 Wet Wiping, HEPA Vacuuming, and Steam Cleaning

These work practices are used either to pre-clean the work area prior to start of work, or for cleaning surfaces as part of a work procedure.

Precleaning of work areas prior to the start of work is done to remove accumulated debris and dust that could be disturbed during the work. Precleaning might include picking up dust and debris with a HEPA vacuum, wet wiping non-porous surfaces, HEPA vacuuming surfaces that cannot be wet wiped, and cleaning any carpeted surfaces using steam extraction equipment. (Note: EPA has determined in a research study that HEPA vacuuming and steam cleaning of carpets does not completely remove asbestos contamination.) Precleaning might reduce the extent of cleaning required after the work and for clearances (if required).

The following work procedures are to be used for cleaning when required in a Work Practice.

Wet Wiping

1. Immerse disposable towel in bucket containing amended water.
2. Wring out towel and fold into quarters.
3. Wipe surface and refold to have a clean face exposed. Do not place towel back into bucket or water will become contaminated and will need to be replaced.
4. Repeat step 3 until all faces of towel have been used. Obtain a clean towel if more wiping is needed.
5. Dispose of used towels in disposal bags.
6. Dispose of contaminated water as required by applicable regulations -See general procedure WI9.

HEPA Vacuuming

1. For floors, use a floor attachment with rubber floor seals and adjustable floor-to-attachment height. For furniture, fabrics or other surfaces use an upholstery attachment or brush attachment.
2. Vacuum hard or smooth surfaces with attachment about 1/16" (2 mm) above the surface.
3. Vacuum carpet or fabrics with attachment just touching the surface.
4. Vacuum all surfaces in parallel passes with each pass overlapping the previous one by one-half the width of the attachment.
5. Once surfaces are cleaned in one direction, clean a second time at right angles to the first cleaning.
6. Use crevice brush or other tools to clean irregularly shaped surfaces.

Steam Cleaning Carpet

1. Steam clean carpet using carpet tool.
2. Steam clean all surfaces in parallel passes with each pass overlapping the previous one by one-half the width of the attachment.
3. Once surfaces are cleaned in one direction, clean a second time at right angles to the first cleaning.
4. Water from cleaning process should be treated in accordance with applicable regulations - See WI9.

Note: EPA has determined in a research study that HEPA vacuuming and steam cleaning of carpets does not completely remove asbestos contamination.

W-10 Polyethylene Drop Cloth

Preparation of work areas for O&M activities typically involves demarcation of the work area, restricting access to the work area and the use of a polyethylene drop cloth.

Preparing a work area with a drop cloth requires that a single layer of polyethylene be spread on the floor of the work area and taped or weighted in place. Do not use more than one layer if ladders (or similar equipment) will be used, unless a hard surface, such as plywood is laid over the drop cloth. If floor is a soft material, such as carpet, use caution to prevent tearing of polyethylene under equipment. The drop cloth should cover an area large enough to catch falling debris. If work is to be performed at an elevated level, the drop cloth should be placed on the work platform, or extended at ground level beyond the immediate work location to catch any debris that might be generated. Note that the use of a drop cloth introduces potential slip hazards in the work area. Non-slip foot coverings are recommended where drop cloths are used. Drop cloths should be thoroughly cleaned if they are moved from one spot to another or reused.

W-11 Packaging and Labeling Waste

Asbestos-containing waste material from O&M activities should be adequately wet in accordance with the NESHAP requirements (40 CFR 61.150). Verify waste packaging and other waste disposal requirements with the landfill that will receive the asbestos waste. Pre-labeled asbestos disposal bags should be used for asbestos waste disposal where possible, appropriate and permissible. Disposal bags should be collapsed by evacuating the air from the bag with a HEPA vacuum in the work area or enclosure. Once collapsed, twist the bag to form a neck and wrap it tight with duct tape. Fold neck of bag over to form a loop, then again wrap duct tape around neck and loop.

Although not a federal regulatory requirement, asbestos waste is often placed into second disposal bag and sealed as described above. Label disposal bags as required by applicable NESHAP, OSHA and DOT regulations.

Asbestos waste that does not fit into disposal bags should be wrapped leak-tight in one or two layers of 6 mil (0.15 mm) polyethylene sheet. Each layer should be sealed tightly with duct tape. Label outer layer as required by regulations.

Sharp objects that might puncture polyethylene (such as floor tile) should be placed into cardboard boxes before wrapping in one or two layers of 6 mil (0.15 mm) polyethylene.

All waste should be labeled as required by federal, state and local regulations. Federal regulations requiring labeling of waste include OSHA regulations 29 CFR 1910.1200, 1910.1001 and 1926.1101, EPA's NESHAP regulation 40 CFR 61.150, and the Department of Transportation's Hazardous Materials Regulations 49 CFR 171 and 180. ACM packaging, with some exceptions, must meet general DOT and EPA requirements and be protective, marked and labeled. Review current labeling requirements with Facility Asbestos Coordinator and disposal site. The OSHA requirements apply regardless of the amount of waste or measured exposure levels (see 29 CFR 1926.1101(k)).

Labeling Requirements

- * **OSHA 29 CFR 1926.1101(k)(8)**

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

- * **Department of Transportation (DOT)**

DOT's shipping paper and marking format, used with some exceptions is as follows:

RQ	Reportable Quantity, if 1 lb. (.4 kg) or more friable asbestos
WASTE	For waste material, if applicable
ASBESTOS	Shipping name; for domestic transportation only.
MIXTURE	For asbestos mixed with a binder or filler, etc.
9	Class 9, Miscellaneous Hazardous Materials, includes asbestos
NA2212	North American identification number; for domestic transportation only.
PGIII	Packing Group; for domestic transportation only
LTD QTY	Limited quantity, if applicable.
20 OZ.	Total quantity of material describe; may abbreviate unit.

- * **NESHAP**

NESHAP requires that readily visible and legible warning labels as specified by OSHA be used on waste containers or wrapped materials (this is the same as the OSHA 29 CFR 1926.1101 label listed above). Waste material to be transported off the facility site must also be labeled with the name of the waste generator and the location at which the waste was generated.

OSHA requires leak-tight containers and labeling for Class II materials (Note that under the EPA NESHAP regulation these are Category I and II materials which are not regulated as long as the materials remain non-friable). For purposes of this O&M program, treat OSHA Class II materials as EPA regulated waste. Maintain OSHA required labels in place and dispose of as asbestos-containing waste in accordance with the NESHAP regulation.

W-12 Applying Lockdown Encapsulant

A lockdown encapsulant should be applied to areas where ACM is removed. Lockdown encapsulants used should be tested per 1978 Battelle/EPA report "Tests for the Evaluation of Encapsulants for Friable Asbestos-Containing Materials". Encapsulants should be water resistant after curing and be Class "A" fire rated per ASTM 84-81A "Standard Method for Surface Burning Characteristics of Building Materials.

Lockdowns need to be compatible with any materials that will be installed over the encapsulant. Note that many lockdown encapsulants will act as an adhesive and could be objectionable on some surfaces when dry. Care should be taken to avoid getting encapsulant on or in HVAC units, HEPA vacuums, and negative pressure machines.

Lockdown is typically applied for O&M work using a garden sprayer. It should be applied in accordance with the manufacturers' recommendations in two light coats sprayed from opposite directions to seal all portions of surfaces including any exposed edges of remaining ACM.

DO NOT APPLY LOCKDOWN ENCAPSULANT ON FIREPROOFING OR TO STEEL THAT IS GOING TO BE FIREPROOFED, WITHOUT PRIOR APPROVAL FROM THE Facility Asbestos Coordinator. The use of spray fireproofing is based on full-scale fire endurance tests of fireproofed steel. Anything that differs from the tested assembly voids the test, and could result in a fireproofing failure. Fireproofing is a non-combustible insulator of steel. Coating it or saturating it with an encapsulant could render it combustible and could reduce its insulating properties. This could cause the fireproofing to fail and as such voids the fire rating. The introduction of an encapsulant between the fireproofing and the steel could cause the fireproofing to fail. The bond of the fireproofing to the steel could be weakened causing the fireproofing to fall off, or the encapsulant could soften and allow the fireproofing to fall off during a fire. Unless the encapsulant has been tested and approved for use by the manufacturer of the fireproofing used, its use will void the fire rating of the fireproofing material.

W-13 Cleaning Tools, Equipment, and Work Area

Clean tools and equipment using HEPA vacuuming and/or wet wiping procedures. Special attention should be given to cleaning extension cords, equipment wheels, vacuum hoses and other items that could pick up debris during the work. Tools and equipment should be placed outside of the work area as soon as cleaning is completed. Drop cloths and mini-enclosures can be cleaned or disposed of as ACM.

Any items that cannot be fully cleaned (such as boots or tools) that might be used in another O&M activity should be placed into disposal bags, sealed and labeled as ACM. These bags should be wet wiped and then placed outside of the work area with the other tools and equipment. Do not open bags containing contaminated tools, or open equipment such as a HEPA vacuum, except during another O&M activity or in a designated work area. HEPA vacuum hoses can be sealed with tape over both ends if the outside of the hose is clean.

Cleaning of the work area where an O&M activity is conducted consists of HEPA vacuuming and/or wet wiping (as appropriate) all surfaces in the area. HEPA vacuuming and wet wiping shall be performed as described in general procedure W9 above.

W-14 Decontaminating Waste

Packaged waste should be HEPA vacuumed and wet wiped before it is moved out of the work area. Use the wet wiping and HEPA vacuuming procedures in general procedure W9. Packaged waste should be placed on a sheet of polyethylene when it is moved outside of the work area. This polyethylene can be the outer portion of a drop cloth, if a drop cloth is being used.

W-15 Worker Decontamination and Removal of Protective Clothing and Respirators

Removal of Protective Clothing

- * **Level B Requirements** (Removal of Protective Clothing When Drop Cloth Work Area Protection, or no Work Area Protection, is Used):

HEPA vacuum all parts of protective clothing while standing at perimeter of drop cloth. Leaving respirator in place, remove protective clothing and fold inside out as it is removed. Place clothing, if contaminated, into a disposal bag and label as ACM waste.

- * **Level C Requirements Where Work Is Performed Inside A Mine-Enclosure Or Other Physical Barrier** (Removal of Protective Clothing If A Mini-Enclosure and Change Room is Provided):

HEPA vacuum all parts of protective clothing while inside work area enclosure.

If two disposable coveralls are used, remove outer coveralls in work area while leaving respirator in place. Fold coveralls inside out as they are removed. Move to change room, HEPA vacuum protective clothing, and remove second set of coveralls in the same manner.

If only one set of disposable coveralls is worn, remove in change room while leaving respirator in place. Fold coveralls inside out as they are removed.

Place protective clothing, if contaminated, into a disposal bag and label as ACM waste. Wash hands, face and surface of respirator with clean water and disposable towels. Use caution to avoid breaking seal between respirator facepiece and face. Place disposable towels into a disposal bag. Remove respirator and follow procedures specified in Respiratory Protection Program for cleaning and storing respirator. Change respirator filters if needed or required and dispose of used filters as ACM. Put street clothes on and exit change room.

- * **Level C Requirements** (Removal of Protective Clothing if an enclosure or mini-enclosure is used and a Shower is Available):

HEPA vacuum all parts of protective clothing while inside work area enclosure. Remove outer coveralls in work area while leaving respirator in place. Fold coveralls inside out as they are removed. Move to change room. Wash hands and wet wipe face and respirator, HEPA vacuum protective clothing. Put on a clean set of protective coveralls over the coveralls already being worn to prevent any ACM debris or dust that may be on the coverall from falling off on the way to the shower. Proceed to shower with respirator still in place. At shower facility, remove protective coveralls, folding inside out during removal. Place clothing, if contaminated, into a disposal bag and label as ACM waste. Shower completely, and remove and clean respirator while showering as described below.

Street Clothing

If street clothes are worn under protective clothing and are contaminated during the work, the street clothes should be HEPA vacuumed, removed during decontamination and placed into a labeled disposal bag. These street clothes should then be disposed of as ACM or taken to a facility that has equipment designed for cleaning asbestos-contaminated clothing.

Removal of Respirator

The procedures described below are based on the assumption that workers wearing respirators have been trained in the use of respirators and, for negative pressure respirators, fit tested, and enrolled in a medical surveillance program as part of a Respiratory Protection Program.

Remove respirator after removing protective clothing (if used). Before removing respirator, wash hands, face and surface of respirator with clean water and disposable towels. Use caution to avoid breaking seal between respirator facepiece and face. Avoid getting water into filter cartridges of respirator. Place disposable towels into a disposal bag. Remove respirator and follow procedures specified in Respiratory Protection Program for cleaning and storing respirator.

W-16 Visual Inspection and Completing Air Monitoring

Visual Inspection

Conduct a visual inspection prior to the start of clearance air sampling. The person performing the inspection can be a worker if authorized by the Facility Asbestos Coordinator. Verify that there is no debris or residue from removed ACM and that all visible dust or debris in the work area has been cleaned up. If visible residue, dust or debris remains, it must be cleaned up using wet wiping and/or HEPA vacuuming before clearance sampling is started.

Perform the visual inspection using procedures approved for use in the facility by the Facility Asbestos Coordinator. If you have not been trained in visual inspection procedures notify the Facility Asbestos Coordinator. The EPA's Purple Book and the American Society for Testing and Materials (ASTM) "Standard Practice for Visual Inspection of Asbestos Abatement Projects" (Document E1368-90) provide visual inspection procedures that might be helpful in developing O&M inspection procedures.

Air Samples

Complete air monitoring work in accordance with Air Monitoring Program and requirements noted on a Work Authorization Form. Verify that removal areas have been encapsulated ("locked down"), that the work area, tools, and equipment have been cleaned, and that the area has passed a visual inspection. When air sampling cassettes are retrieved, the air monitoring person should record the stop time for the samples and check and record the flow rate of the air monitoring pumps. Samples should be analyzed on-site (for PCM analysis) if possible, or sent to a laboratory for analysis. When sample results are received, compare results to Air Monitoring Program criteria for work release or clearance. If sample results exceed criteria, the work area should be recleaned, reinspected, and then additional air samples should be obtained. If samples are equal to or below release criteria, tear down work can proceed. Collect air sampling pumps and equipment from work area and other locations when air sampling work is completed.

W-17 Waste Transportation, Storage and Disposal

Transport asbestos waste from O&M activities to a designated storage area or an approved landfill after the work is completed. Workers transporting waste should follow Respiratory Protection Program recommendations concerning respirator requirements for transporting asbestos waste. Do not drag packaged waste. All waste should be lifted and carried, or transported in wheeled carts, when moved from one area to another. Packaged waste should be placed, not thrown or dropped, into vehicles, storage areas and the landfill.

Any asbestos waste that is not taken to a landfill should be stored in a secure, lockable area. Signage in accordance with NESHAP should be posted at the storage area and on vehicles used to transport asbestos-containing waste material during loading and unloading. When asbestos waste in the storage area is taken to a landfill, it should be transported in accordance with all applicable federal, state and local regulations. Asbestos waste shipment records should be completed in accordance with the requirements in NESHAP Section 61.150.

The workers conducting the O&M activity should fill out part 1 of the waste tracking form included in Appendix D or an equivalent form. Once part 1 is completed and the waste is stored or taken to a landfill, the form should be turned over to the Facility Asbestos Coordinator to complete part 2 and file with O&M records. NESHAP waste shipment records must also be completed (where applicable) and filed with waste disposal records.

W-18 Glovebag Removal (Also includes other types of prefabricated removal enclosures)

Remove asbestos-containing material inside a glove bag according to the following procedures. Glovebags should be used only once and should not be moved to another location to perform additional removal work, or reused in any way. Use only 60" X 60" standard glovebags. Do not use glovebags on surfaces or equipment that is over 150°F. If you encounter a situation that requires a special type or size of glovebag, or if hot surfaces are involved, notify Facility Asbestos Coordinator.

Other types of prefabricated removal enclosures include "glovebox" type enclosures, glovebags with self-supporting frames, and glovebags that funnel waste into standard disposal bags. Check with equipment suppliers for information on these enclosures.

Glovebags might be used with a framework for O&M work on flat areas such as surfacing materials. Note that significant asbestos exposures to workers can result from the improper use of glovebags. Workers should obtain information on current regulatory requirements on glovebag use from the Facility Asbestos Coordinator.

Glovebag Removal Procedures

Check area where the work will be performed. If damaged ACM is present (broken lagging, hanging, etc.), wrap in polyethylene and cover polyethylene with strips of duct tape for reinforcement. Place one layer of duct tape around the removal area where the glove bag will be attached. Also protect any damaged ACM outside the glovebag area that could be disturbed during the work.

Slit top of the glove bag open (if necessary) and cut down the sides to accommodate the removal area.

Place necessary tools into pouch located inside glove bag (or into a sleeve turned inside out). Tools needed typically include: scraper, bone saw, utility knife, disposable towels, nylon brush, abrasive pads, wire cutters, tin snips and pre-wetted lag cloth. Cut lag cloth to sizes needed to cover any ACM that will remain after glovebag work is completed.

Place one strip of duct tape along the edge of the open top slit of glove bag for reinforcement.

Place the glove bag around area to be worked on and staple top together through reinforcing duct tape. Provide 8-12" (200-300 mm) of space inside glovebag between removal surface and glovebag for working room. Secure glovebag to duct tape previously installed around removal area.

Use smoke tube and aspirator bulb to test seal. Place tube into water sleeve (two-inch [50 mm] opening to glove bag) squeezing bulb and filling bag with visible smoke. Remove smoke tube and twist water sleeve closed. While holding the water sleeve tightly, gently squeeze glove bag and look for smoke leaking out, (especially at the top and ends of the glove bag). If leaks are found, tape closed using duct tape and re-test.

If a negative pressure glovebag with a supporting framework and HEPA filtered makeup air port is being used, attach hose from an operating HEPA vacuum to glovebag to provide negative pressure in glovebag. Follow equipment manufacturer's instructions on use of negative pressure equipment.

Insert wand from garden sprayer with amended water through water sleeve. Duct tape water sleeve tightly around the wand to prevent leakage.

Insert arms into glovebag sleeves.

Remove any metal jacketing or covering over the area where removal is required using tin snips and/or wire cutters. Fold in any sharp edges to avoid cutting the bag. Pierce any painted coverings to permit water to soak into the ACM.

Adequately wet material to be worked on with amended water and allow to soak in. Wet adequately to penetrate and soak material through to substrate.

Cut insulation section to be removed using bone saw or utility knife. Use caution to avoid cutting glovebag. Lift glovebag away from cutting area if necessary.

Throughout this process, spray amended water or removal encapsulant on the cutting area to keep dust to a minimum.

Remove insulation using scraper or other tools. Place pieces in bottom of bag without dropping. Rinse all tools with amended water inside the bag and place back into pouch or a sleeve of the glovebag turned inside out.

Using nylon brush, scrub pads, disposable towels and amended water, scrub and wipe down the removal area.

Seal exposed ACM around removal area using pre-wetted lag cloth or encapsulate with a bridging encapsulant. Encapsulate removal area with an appropriate lockdown encapsulant. Use suitable high temperature encapsulants for hot piping.

Wash down inside of glovebag with amended water and wipe as necessary to move all debris and residue to lower part of glovebag (below where bag will be twisted and cut).

Remove water wand from water sleeve, twist water sleeve closed and seal with duct tape.

From outside the bag, pull the tool pouch or sleeve away from the bag and twist pouch to seal it from rest of bag. Place duct tape over twisted portion and then cut the tool bag from the glove bag, cutting through the twisted/taped section.

Contaminated tools might then be placed directly into another glove bag without cleaning. Alternatively, tool pouch with the tools can be placed in a bucket of water, opened underwater, and tools cleaned and dried. Discard disposable towels and nylon brush with asbestos waste. Dispose of contaminated water as set forth in general procedure *W19* below.

Evacuate air from glovebag using HEPA vacuum. With HEPA vacuum operating and removed insulation in the bottom of the bag, twist the bag several times and tape it to keep the material in the bottom during removal of the glove bag from the removal area.

Slip a 6 mil (0.15 mm) disposal bag over the glove bag (still attached to removal area). With the hose of an operating HEPA vacuum inserted in the upper part of glovebag, remove tape or cut bag and open the top of the glove bag and fold it down into disposal bag.

Use of a Glovebag with Self-Supporting Frame

Glovebags on self-supporting frames can be used for some O&M activities on surfacing materials, and might be able to be adapted for other types of ACM. The general procedures for using these units are as follows:

Construct a rectangular or square frame of 1 ½" (38mm) diameter PVC or ABS pipe. Supporting legs can be made of lengths of pipe and fittings as needed to achieve the required height. Proprietary frames with telescoping legs are available.

To install glovebag on the frame, fold top edge of bag over the frame sides and extend the open edge of the bag at least 10" (25 cm) beyond the frame. Secure the open edges to the rest of the bag using duct tape. Place tools and supplies needed procedure above) in tool pouch inside glovebag.

Place frame and glovebag assembly below work location so that frame is close to, but not touching, ACM. Location and proximity of frame to ACM should allow for some movement without disturbing ACM during the work.

Insert wand of garden sprayer with amended water into bag and seal in place.

Cut hole in glovebag for negative pressure equipment hose. Negative pressure equipment could be a HEPA vacuum or small negative pressure machine. Install hose and seal in place. A prefilter might be needed to prevent any gross ACM debris from being drawn into the negative pressure device.

Install a hose from an operating HEPA vacuum into the bag in a position where it can be used during the work. Turn on negative pressure device and smoke test all sides of glovebag frame unit to verify that negative pressure is present. If sufficient negative pressure is not present, reduce clearance between ACM and frame (if possible), or add additional negative pressure device(s).

Insert hands into glove arms and wet ACM where work is required. Perform work as needed. Caution: If bag is overloaded with tools or other materials, bag might break or release from frame.

HEPA vacuum and wet wipe tools and inside of bag. Adequately wet any ACM debris in glovebag.

Slowly lower frame to allow tools to be removed from bag.

Gently remove glovebag from frame and twist to form a neck. Evacuate air from bag using HEPA vacuum and tape bag closed.

Remove garden sprayer wand, negative pressure device hose, and HEPA vacuum hose and seal holes with duct tape.

Place glovebag into a labeled 6 mil (0.15 mm) asbestos disposal bag and seal bag.

W-19 Disposal of contaminated water

Contaminated water from O&M activities should be disposed of in accordance with all applicable federal, state and local regulations. Filtering might be required. If filtering is required, water should typically be filtered through a maximum 5 micron (5 μ m) water filter before discharging water into a sanitary sewer system, if permitted. If a filter unit is not available at the work location, contaminated water can be put into leaktight drums and transported to a location with filtering equipment. If a portable shower unit with filtering equipment is available, contaminated water can be emptied into the shower and filtered through the shower filter system.

W-20 Mini-Enclosures

Note: *Polyethylene work area protection is not to be used in place of other engineering controls and good work practices. Work practices such as wetting ACM, careful handling, local collection by HEPA vacuum and local exhaust ventilation should be the primary means of fiber control during O&M work. Mini-enclosures are intended to protect the environment, workers are protected by work procedures and engineering controls that prevent elevated airborne fiber levels, and by respiratory protection, protective clothing, decontamination procedures and other worker protection methods. State or local codes might require that fire retardant polyethylene be used for asbestos related work.*

Preparation of work areas for O&M activities sometimes involve the use of a mini-enclosure. Other techniques, such as the use of a glovebag taped over a self-supporting framework might be used as a substitute for a mini-enclosure where appropriate. For small amounts of removal work (such as removing a small amount of fireproofing, or cutting a hole in asbestos-containing plaster) where an enclosure is desired or needed, a glovebag can be used in lieu of a full mini-enclosure.

Mini-Enclosure

A mini-enclosure is usually a polyethylene enclosure around a work area. Mini-enclosures are sealed enclosures used to protect the facility environment as a secondary means to help, or attempt to, contain fibers or debris generated during the work.

Mini-enclosures also serve to provide a visual barrier between the workers and any other personnel around the work area. As noted above, careful work practices should be the primary means of fiber control during the work in order to prevent gross contamination of the mini-enclosure.

It is sometimes appropriate to extend mini-enclosures above ceilings, such as by using polyethylene sheet and framing taped together to provide enclosure around the work area. The mini-enclosure should not contact ACM covered surfaces. The construction will vary depending on whether the enclosure will be attached to pipes, conduit, metal hangers, or some other form of existing construction.

There are a variety of commercially available types of mini-enclosures, including prefabricated pop-up boxes and adjustable framework assemblies to permit different sizes of enclosures to be constructed. Disposable liners for mini-enclosures (to facilitate set up and dismantling of the enclosure) are available from some manufacturers. It might be beneficial to construct or purchase a portable mini-enclosure unit that works for the typical conditions found in a given facility.

It is recommended that two workers be used to set up and operate mini-enclosures. To construct a mini-enclosure, erect a framework of wood, PVC piping or metal framing that will enclose the work area and be large enough for one person to work inside. The minimum width and depth of the enclosure should be at least 3 feet (1 meter). The height of the enclosure will vary depending upon the work to be performed and the height of the work area. A larger enclosure is preferable where space permits. However, if the enclosure is too large, the final cleaning process will require more time. A mini-enclosure can include a separate 3 foot by 3 foot by 7 foot (1 x 1 x 2.1 meters) change room, with curtain doorways, attached to the mini-enclosure for changing and removing protective clothing.

If an entire room will be enclosed for performing work, the framework is usually not necessary, unless wall surfaces will be damaged by tape used to support polyethylene. A room can be enclosed for O&M work by installing one layer of polyethylene sheet on the walls and floor of the room.

If the work to be performed is in an elevated location, the enclosure (and change room, if used) should be erected on a scaffold platform large enough to support the enclosure, change room (if used), and a step off area outside the enclosure.

Refer to OSHA regulations 29 CFR 1910.28 and 29 CFR 1926.451 concerning scaffold requirements. Any ladders and/or scaffolds used must be built and used in conformance with the OSHA construction standards, and applicable state and local standards.

Cover the floor and the framework for the enclosure and change room with one layer of polyethylene attached using duct tape. A second layer of polyethylene laid on the floor might facilitate clean up work, or reduce the possibility of tearing the polyethylene if equipment is used (do not use two layers under the legs of ladders). Construct curtain doorways between the change room and the enclosure and between the change room and the area outside the change room. A curtain doorway is made of three overlapping sheets of polyethylene. Attach sheets to framework at top and one side. The middle sheet should be attached on one side, and the inner and outer sheets attached on the other side. A sheet of polyethylene approximately 5 feet by 5 feet (1.5 meters by 1.5 meters) or larger should be installed outside the change room for use as a step off area and as a place to put decontaminated materials removed from the work area.

Mini-enclosures should be constructed with a ceiling of polyethylene if work will not be performed above the enclosure. If work is to be performed above the enclosure and the ceiling is not ACM, the enclosure should extend to and be sealed to the ceiling or grid system. If the enclosure is below an ACM finished surface, use one of the following methods:

- * If ACM cannot be contacted, the enclosure should be separated from the ceiling by a narrow space.
- * If ACM will withstand contact without damage and is in good condition, foam tape (1" (25mm) or thicker) can be placed on the top edge of the enclosure. Gently lift enclosure into place until sufficient contact is made to provide a seal to the surface.

After enclosure is in place, check for, and clean up any debris generated by enclosure installation.

Mini-enclosures should be set up with a negative pressure system as described below to reduce the possibility of fibers being released from the enclosure and to filter the air inside the enclosure.

Negative Pressure System and HEPA Filtered Local Exhaust Ventilation

Mini-enclosures should be provided with a negative pressure system to reduce the possibility of fibers being released from the enclosure during the work, and to filter inside air discharged from the enclosure. Negative pressure inside mini-enclosures is commonly provided by a High Efficiency Particulate Air (HEPA) filtered vacuum or by negative pressure machines, depending upon the size of the enclosure.

A HEPA vacuum will usually provide sufficient negative pressure for a small enclosure. Larger enclosures might require a small negative pressure machine (HEPA filtered fan unit) to achieve a negative pressure inside the enclosure.

A negative pressure system for a mini-enclosure most commonly locates the HEPA vacuum or negative pressure machine outside the enclosure. The intake side of the unit is ducted to the enclosure through the vacuum hose or flexible duct material taped to a hole in the enclosure on the side opposite from the change room or as close as possible to where the work will be performed. The filtered exhaust side of the unit should be ducted to the outside if possible. However, most vacuum units do not provide a connection for an exhaust duct, and are commonly exhausted to the inside. Additional protection might be desirable for an area where air is exhausted inside a building. A work practice is provided for changing filters in HEPA vacuums and negative pressure machines (HEPA filtered exhaust fans) when needed. Filters should not be changed without following these work practices.

When HEPA filtered local exhaust ventilation is used in a work practice, this can be in addition to, or in place of, a negative pressure system. A HEPA filtered local exhaust ventilation system might replace a negative pressure system if the ventilation system provides adequate negative pressure in the work area. Some work practices use HEPA filtered local exhaust ventilation for fiber control where an enclosure is not used. A HEPA ventilation system can use a HEPA vacuum or negative pressure machine. The hose attached to the HEPA unit should be kept as close as possible to the location where ACM might be, or is, disturbed.